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RADIO CONTROL

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car action

THE WORLD'S BEST-SELLING RC CAR MAGAZINE

5 MEGA MOD MONSTERS

We build 'em, bash
'em & rate 'em pg. 94

TRACK TESTS

Bolink
Nitro Racer
Schumacher
Axis Pro
Tamiya
Mad Bison
Kyosho
Ultima ST Type R

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Understand Gear Ratios

MAXIMIZE ENGINE PUNCH

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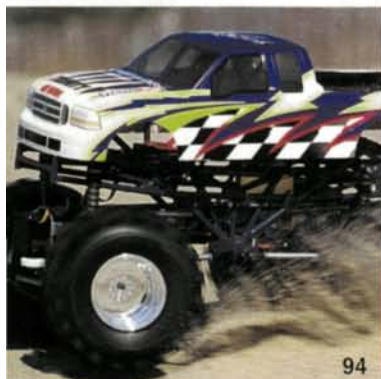
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Have a Spec-tacular race season!

Spec racing. It's a particularly hot topic these days, but one that has always been on the minds of racers. By definition, this is a class that allows only one type or brand of equipment to be used. A spec class may simply allow only one type of motor (as in stock racing), or it could be an all-encompassing set of rules as seen in "Street Spec," Trinity's inspired pan-car program that includes class-specific tires, motors, batteries and chassis along with limited ESC and radio options. Team Losi's proposed Dirt Spec program would bring similar controls to off-road racing. Most recently, in an effort to keep the racing fair and reduce costs to racers, Pro-Line announced plans to partner with the Florida State Electric Auto Racing Association to promote a series of events that will be run on Pro-Line-supplied, strictly regulated spec tires (see this issue's "Inside Scoop" for details).

These are all fine examples of programs designed to benefit racers and help grow the sporting side of the hobby, but they aren't the only way to go spec racing. If my experience with two local track-operating shops (Xtreme RC in New Milford, CT, and RC Madness in Enfield, CT) is any indication, shop owners are building classes around kits that are selling well. Most notably, both of these tracks plan to run a Traxxas T-Maxx class, based on the runaway popularity of the ready-to-run kits. Purists may sneer that the T-Maxx isn't meant for racing, and therefore, they'll have nothing to do with a T-Maxx class (these are the same guys who slam Street Spec for its simple, relatively nonadjustable fiberglass cars). If that's how you feel, then frankly, you don't get it. Great racing comes from close competition, not the complexity of the hardware on the track. If a T-Maxx class (or Street Spec, or Dirt Spec, or any spec class) isn't for you, then don't race it. But don't shut out those untold numbers of backyard bashers and parking-lot cruisers who show up on race day just to watch, or who run the track during the week but never sign up for a race because they feel they can't compete.

Track owners, I encourage you to offer exciting race programs not only to the guys who compete every weekend, but also to those folks who might rent track time during the week or check out the action from the bleachers, but who haven't yet entered a race themselves. If they're in the hobby, then they probably would like to give racing a try. Racing needs them; let's give them the affordable, fun competition they're looking for.

IN THIS ISSUE ...

That T-Maxx class sounds good, but the Clod Buster is still king of the monsters. This month, "4x4" columnist Kevin Hetmanski takes on the top dogs of the aftermarket Clod chassis game. If hard-hitting hardware is your thing, Kevin's "Mod Clod Shootout II" is sure to get you fired up.

Bolink has a new oval racer you can literally fire up—it's nitro powered. Contributing author Chuck Carter puts the Bolink Nitro Racer through its paces on the banking of the famous Sugarbowl raceway and reveals the spec setup his nitro LTO buddies run at the 'bowl. See? You *can* make your own racing.

Want more nitro? We have a complete test of Tamiya's new Mad Bison gas truck and a healthy dose of nitro know-how with a "Tech Insight" piece devoted to clutch systems. Look for more "Tech Insight" articles soon; they're your source of next-level information that will help you better understand how your car works. Remember, know-power is go-power.

Peter Vieira, Executive Editor

DREAM JOB ALERT • EDITOR

We're looking for an enthusiastic, organized individual to join our *RC Car Action* group. This in-house (Ridgefield, CT) position requires knowledge of the RC Car hobby, writing and editing experience, and the ability to coordinate schedules and meet deadlines.

Send cover letter and resume to:
Air Age Publishing
Manager, Human Resources
100 East Ridge
Ridgefield, CT 06877-4606
Fax (203) 431-3000
Email resumes@airage.com

RTR Sound-off

I want to give a little support to Ryan Vasey, who wrote to you about ready-to-runs. I have to tell ya—I couldn't agree with Ryan more. I got into RC cars with a Tamiya Fox. I remember getting it for Christmas. I had so much fun getting all the parts bags together and scratching my head for a few hours until I got it just perfect. Painting it, breaking it, fixing it; I had so much fun with that car. But most of all, I remember building it. I was so young and had such a huge sense of accomplishment knowing that I was actually able to build a "real" radio control car. To me, building was the "hobby" part of owning a radio control car. That was how I distinguished between a hobby car and a toy car. Now, the RTRs have taken the building part away and left a car with little "hobby" in it. I realize the cars are no different, but it seems the part of the hobby I liked most as a kid has been taken away. You said in your response to Ryan, "If the RTRs bring more people to the hobby, that's great for all of us." I see where you're coming from, and I agree up to a point. However, I'm not so sure that the people who buy RTRs are really in it for the hobby aspect of it. I can't be the only guy who feels this way; I know Ryan agrees with me. [email] JOHN THORNTON

Somehow, you seem to have gotten the impression that I'm anti-kit and anti-building, and that couldn't be more wrong. For me, building and tinkering are the number-one attractions of this hobby. However, I stand by my opinion of RTRs: ready-to-run kits will allow more people to experience "real" RC. True, some of them may not stick with the

hobby, but at least they were able to try it; many would-be RC car hobbyists are afraid that building a kit will be too much for them, so they never try RC. On the other hand, many RTR buyers may stick with the hobby.

I do wish all RTRs were also offered as kits; for example, I wish I could build my own T-Maxx, but that simply is not an option. But I can definitely take one apart, and that can be just as much fun.

It would be foolish to keep people out of RC just because they aren't "really in it for the hobby aspect of it." I personally don't care if a kid wants to buy a Traxxas T-Maxx, RC10GT RTR, or any other ready-to-run kit, pay someone to paint the body (if it isn't pre-painted), drive the wheels off it and have all the repairs performed by a hobby shop. I wish everyone could enjoy the same satisfaction from building and tinkering as I do, but some folks just aren't mechanically inclined. RTRs are for those people.

—Pete

The White Stuff

Billy (Easton), Dwayne (Silva), Greg (Hodapp) and I scoured the warehouse looking for any white parts we could find to help out Chad Glennie ("Readers Write," May 2000). We managed to uncover a few parts (and spiders) from underneath old storage bins, and some of the guys donated stuff from their personal stashes of old

parts. Looks as if these were just about the last original RC10 parts left in the building, so if anyone else is looking for parts to restore his "golden bathtub" RC10, his best bet is probably eBay!

MIKE OGLE

Team Associated

Wow, you guys really went above and beyond! Thanks for sharing the photos with us, and on Chad's behalf, thanks for making the extra effort.

—Pete

This one's for the Ladies

I am an RC driver's girlfriend, but I am slowly becoming an RC widow. Every weekend, I awake before the sun rises and venture out into the cold to a track in the middle of nowhere. It is here that my boyfriend sets up his pit area. As I watch him mess around with his

car, I wonder why he did not prepare himself the night before. Then, I remember: we were racing at So Cal until 1 a.m. I notice more and more guys arrive, busily unpacking and setting up their cars; they look as though they, too, never made it home the night before. I often wonder what became of their girlfriends; did they become RC widows? If I am lucky, a

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Air Age Inc., Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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Kevin Hetmanskil: kevinh@airage.com
Steve Pond: stevep@airage.com
Pete Vieira: peter@airage.com
Greg Vogel: gregv@airage.com

fight will break out over a duplicate frequency, or a turn marshal will be taken out by a Dodge Stratus. This is what I look forward to—the amusement I get from watching grown men act like boys. That's all they are: boys. They fight like little boys. When they lose, they just cannot accept it. They have to blame it on the hacker who took them out, or the person in the pit playing with his radio, or the ever-so-slow turn marshals. I have come to accept my life as an RC driver's girlfriend. It's kind of exciting; after all, I'm usually the only female there. I can sometimes distract these guys and drive them into the losers' circle. Boys will be boys. [email]

ANGELA GRODELL

Angela, why don't you race? You're already spending all your time at the track. When your boyfriend starts losing races to you, I bet he'll spend less time racing and more time with you. Either that, or you'll break up bitterly when he refuses to give you a pair of crystals to resolve your frequency conflict in the A-main.

—Pete



"Nitro" Fans

I really enjoyed the "Nitro" issue. I race in an RC club in Sudbury, Ontario, Canada. Most of us race Serpents and BMTs, but we all agree that this type of magazine needs to be put out a lot more often. We were wondering whether you could include more info on cars such as the Serpent Impact M2, HPI Proceed, etc., and any hop-ups available.

I hope to see another "Nitro" issue out very soon! [email] SCOTT VOLPEL



I love your first "RC Nitro" magazine, and I was wondering whether subscriptions will ever be available. If so, how, when and where do I get one? [email] BRIAN AMATO

I think your new "Nitro" magazine is great! Will I be able to subscribe to it? [email] MIKE CLEM

Hello! My children and I have two Nitro Stampede trucks. We are interested in subscribing to your maga-

zine "Nitro RC." How do we go about it? [email] TOM

There absolutely, positively are more issues of "Nitro" on the way; it will be a quarterly magazine—next issue available this summer. Watch for the subscription ads in future issues of *Radio Control Car Action*. Missed the first issue? Order it directly by calling (800) 877-5169. —Steve



BY CHRIS
CHIANELLI

MACHINE SHOP

Right now there's nothing hotter in hop-updom than machined-aluminum parts. Here's a sampling of the best.



TRINITY

FOR ASSOCIATED TC3: spur-gear hub, shock mounts, motor heat sink, motor-mount cam, bearing cap and steering rack.

FOR KYOSHO TF-4: battery braces, left and right motor plates, transmission-bulkhead standoff, servo mounts, steering drag link, spur-gear mount.

FOR HPI RS4 PRO 2: rear shock tower, front upper bulkhead, spur-gear mount.



Trinity has alloy stuff for just about everybody! The gold goods are for the TF-4, the blue stuff will dial-in your TC3, and the purple parts are for the Pro 2. Highlights include the TC3 shock mounts, which feature Delrin pivot balls that can be adjusted to compensate for wear (Trinity offers these for just about all off-road machines and tourers), and the TC3 spur-gear adapter has six mounting holes for a rock-solid spur gear. For you Kyosho guys, the machined drag link is a sleeper hop-up that's sure to outperform the stamped stock piece, and the machined spur-gear hub beats the kit's plastic hub for no-wobble precision. And last, Trinity's shapely shock tower, lightweight spur mount, and flex-free front upper bulk head will surely separate your HPI RS4 Pro 2 from the masses.

Trinity Products Inc., 36 Meridian Rd., Edison, NJ 08820; (732) 635-1600; fax (732) 635-1640; www.teamtrinity.com.



HAMMAD GHUMAN

FOR HPI NITRO RS4: chassis, hex hubs, body posts, rear hubs and upper Y-brace.

HG definitely has the prettiest Nitro RS4 chassis going, and with its super-tough 7075 aluminum construction, it should prove board-proof. The Y-brace is made of the same stuff. The aluminum body posts are sure to set your Nitro RS4 apart from the crowd, and the hex-hubs look trick and won't strip. For extra board-busting durability, add HG's aluminum rear hub carriers. More Nitro RS4 parts are on the way, including outdrives and suspension arms; I'll keep you posted.

Hammad Ghuman Inc., 6 Tower Heights, Albany, NY 12211; (518) 782-9255; fax (518) 782-9256; www.1hg.com.



IRRGANG RACING SERVICE

FOR ASSOCIATED TC3: battery brace, motor heat sink

I already scooped Irrgang Racing Services' lightweight 7075 aluminum outdrives for the TC3 (April 2000), but now IRS has added two more items to its TC3 lineup. The battery brace/heat sink is aggressively finned on top and deeply scalloped on the bottom to hold the cells tightly and provide plenty of cooling contact area. The motor heat sink has more fins than that crud-ly monster from "Leviathan" (don't rent it) and should keep your TC3's motor cooler than Kurt Russell at the end of "The Thing" (rent it).

Irrgang Racing Service (IRS), 18 Cannon Rd., Milmay, NJ 08340; phone/fax (609) 476-2371.

JT RACING PRODUCTS

FOR ASSOCIATED TC3: spur gear hub, battery brace, steering knuckles, suspension arms, steering rack, hex hubs and servo mount/transponder stay.

My favorite is the combined servo/transponder-mount setup; it's way more stylish than the stock Lexan bracket. Super-tough 7075 aluminum used for all the pieces.

JT Racing Products, distributed by Bruckner Hobbies, 3587 East Tremont Ave., New York, NY 10465; (718) 863-3434; (800) 288-8185.



LET BARRY
BUILD IT

Yokomo's most outspoken wheel jockey now has his own signature car! The Barry Baker Edition MR-4TC Pro is extraordinarily faithful to Barry's actual race rig. The car includes the same electronics, motor and battery as used by "the fabulous one," and Barry even builds each car himself

(although I suspect some lackey threads the turnbuckles for him). Barry supplies your choice of ZR-138G or ZR-138M tires mounted on 24mm mesh wheels with ZR-037F molded inserts (glued and ready to race). Barry's MR-4TC Pro replica includes special-edition, blue-anodized Lunsford titanium turnbuckles. A very limited number of Barry Baker cars will be produced, and each will include an engraved tag with serial number and signature. Can a Franklin Mint commemorative plate be far behind?

Yokomo USA, Airport Business Center, 17951 Skypark Cir., Ste. K, Irvine, CA 92614; (949) 252-8663; fax (949) 252-8657; www.yokomousa.com.

READY TO RALLY

George Gonzalez revealed Kyosho's Alpha series in last month's edition of "Scoop," but these studio shots of the Alpha rally cars were too pretty to pass up. The Subaru Impreza, Ford Focus and Peugeot 206 are all offered with Kyosho's new Perfex radio set, prepainted bodies, 540 motors, pregrooved tires and a belt/gearbox 4WD drive train. Look for reviews soon.

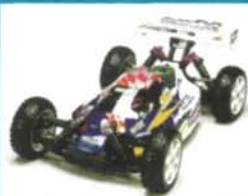


... While I'm on the topic of RTRs, DuraTrax now has Sanyo 2400 packs that are ideal for all your playin' around needs. Big D offers 6-cell packs, 7-cell flat packs and 7-cell hump packs with the new cells. DuraTrax; distributed by Kyosho/Great Planes, P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948.



O.S. is ready to join the 1hp-plus elite with its new 12CV-R. The race-bred, more thermally efficient cylinder head is easy to spot; what you can't see are the all-new porting and true, chrome-plated sleeve. The CV-R is expected to be available with a slide or rotary carb, and in .12 and .15ci sizes. More information will be available when this engine hits our shores.

One-horse O.S. CV!



Mugen's new MBX4RR is set to debut at this year's IFMAR 1/8 Off-Road World Championship in Las Vegas. The new car reportedly contains 75 percent all-new components, so it's significantly different from Mugen's current model. The RR also features a different final drive ratio that allows the use of a smaller spur gear. This smaller gear allows the engine to be moved closer to the car's centerline to improve overall balance and handling. Longer rear shocks, molded diff housings, engine mounts, and possibly new aluminum arm mounts should equip the kit when released, probably in early spring. For more information, contact Mugen Seiki Racing Ltd., 17971 Sky Park Cir., Ste. G, Irvine, CA 92614; (949) 475-9505; fax (949) 475-9511; or log on to: www.mugenseiki.com.

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TC 3 Gas Conversion

Original

Tamiya's Jug replacement is officially available, complete with the much-discussed, beefier drive train. "4x4" columnist Kevin Hetmanski already has his Jug 2 put together, and he told me exactly what's up with the new drive parts.

- **Redesigned universals.** The new drive shafts are rebuildable (the drive pins are retained by E-clips) and have a tighter fit.
- **New axle gear ratio.** The Jug's axle internals now feature a lower gear ratio that will take some strain off the rest of the drive train.
- **Transmission heat sinks.** To prevent the gear shafts from heating up because of bushing friction, aluminum heat-sink plates have been added to the outside of the center transmission. (Kevin plans to add bearings, which will also reduce heating.)
- **Beefed up bevel gears.** The Jug 2's new drive bevels are twice the size of the original units and are now supported by bearings on both sides of the gear.

HERE AT LAST: JUGGERNAUT 2



As I'm typing this, Kev is pounding on the Jug 2 with a variety of motor combinations to see whether the new tranny parts will resolve the durability problems of the original truck. Look for a full report in the next issue!



GREG VOGEL NOW BIONIC. Well, maybe not bionic, but *Radio Control Car Action's* assistant editor does have a couple of stainless steel plates in his right arm after a snowboarding mishap. Greg popped both his radius and ulna, which is the skeletal equivalent of breaking a tie rod and camber link at the same time. Send your get-well cards to:

Poor Wittle Gweg Bwoke His Arm, c/o *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877; gregv@airage.com.



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Shock towers and shorter front shocks allow for lower mounting of body

www.teamtrinity.com

TRINITY

Porsche 911 GT-1

Protoform's much anticipated "pan sedan" shell is at last available. It's designed to fit Associated's RC10L3 Touring chassis (and similar models from Corally, Savage and Superior) and takes full advantage of the chassis' super-low profile. Naturally, you get window masks and a full decal sheet, but this body even includes molded struts and hardware for the full flying wing and add-on spoiler. Sweet.

Protoform Inc., 5455 Southwestern Blvd., Hamburg, NY 14075; (905) 646-7638; fax (905) 646-2476.



BODY SHOP



Vauxhall Vectra

You can't get the real deal here in the States, but Proto's Lexan version will let you run a 1/10 Vectra. This brand-new shell includes a high-downforce wing, mounting hardware, window masks and detail stickers, and it's legal for all ROAR, NORRCA and IFMAR events. You can get one in 190mm and 200mm styles to fit any touring car.



Protoform Monte Carlo SS, Taurus SS, Pontiac HD

Oval racers, your looks for 2000 have arrived! Protoform's latest Pontiac, Taurus and Monte Carlo shells are ready to hit the banking and bullrings.

The Monte Carlo SS and Taurus SS are "intermediate" designs for both carpet and paved ovals, while the Pontiac has been given Protoform's HD (high downforce) designation and is a good choice for low- or no-bank ovals. All of Protoform's new NASCAR shells include window masks, add-on spoilers and loaded decal sheets and are available in regular and "lite" Lexan.



HPI Mercury Cougar

While you save for that V6 Cougar, try one of HPI's Cougar shells for your nitro tourer. The 200 body includes decals for window trim, headlights, grills, and taillights, and HPI even gives you the "slash" graphics. The big ol' wing (and hardware to mount it) is part of the package. For fast finishing, overspray film and vinyl window masks are also included.

HPI Racing, 15321 Barranca Pky., Irvine, CA 92618; (949) 753-1099; fax (949) 753-1098; www.hpiracing.com.

PRO-LINE GETS SPEC

Control (or "spec") tires are a hot topic among touring car racers, so this news item is sure to get a lot of buzz. The Florida State Electric Auto Racing Association (FSEARA) and Pro-Line have announced plans for a race series using a tire developed specifically for control series racing. According to a statement from Pro-Line's prez Todd Matson, "This concept not only will attract new racers to our hobby, but will also set the standard for touring-car competitions into the next millennium."

Classes for the event will include stock, modified and 19-turn motors (Chameleons, I'm guessing). The single, official, legal tire will be Pro-Line's latest 24mm tire in the extended-wear H13 compound. Pro-Line says several of the State Series organizers, including Tony Padilla, FSEARA director, tested numerous brands and tire compounds before determining that the Pro-Line tire was best for the conditions that Florida racers encounter.

The H13 tires will be delivered to the organizers with "control tire" imprinted on their sidewall, for use as the handout tire. The same tire carcass and compound with a sidewall that reads "Pro-Line 1095" will be used for practice and pre-event preparation and testing.

Pro-Line's control tire will also be used at the Reedy International Touring Car Race of Champions in Ripon, CA, this summer.

Pro-Line/Jaco, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

What do you think of the control tire concept? I invite you to email your comments to me at chris@airage.com, or snail-mail me: Chris Chianelli, Air Age Publishing, 100 East Ridge, Ridgefield, CT 06877-4606.



OFNA OB-4 NOW NITRO POWERED

Looks as though OFNA's most unusual touring-car offering has gotten a nitro transplant! The pivot-ball suspension parts are lifted straight from the mid-motor electric tourer, but the 3mm, CNC'd "Serpent-style" chassis, graphite upper deck and 3-belt drive train

are all new. The Nitro OB-4 will not include an engine, but you will get the following:

- Full bearings.
- Pipe and manifold.
- 2-speed transmission.
- Threaded shock bodies with aluminum preload collars.
- Soft carrying case.

The car should look just like the one shown here, minus the ball diffs; gear diffs are included with the kit. We'll test one soon.



Win a \$500 gift certificate from DuraTrax! Send a sharp, uncluttered, well-exposed color photo of your vehicle (no Polaroids), and a brief description, to Readers' Rides, *RC Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. If we publish your photo, you'll receive a free *RC Car Action* decal sheet and will be eligible to win a \$500 gift certificate from DuraTrax in the "Readers' Rides of the Year Contest." Write your address and phone number on your letter and on the back of every photo you send. Good luck!

Readers' Rides

Hector Coronel Tamiya TL01 Quezon City, Philippines

Hector says this TL01 is his first RC car. Upgrades include oil-filled shocks, ball bearings, ball differentials, Acto-Power motor and a Novak ESC. A Futaba radio keeps it on track. Hector also enjoys painting bodies; he has an 11-color Ford Focus and a Lexus IS 200, both painted with an airbrush.



Dale and Tommy Copeland Tamiya Wild Willys Auburn, WA

These kits were built by a father-and-son team. Both vehicles run on Airtronics XL2P radios and are equipped with DuraTrax Blast ESCs. Dad Dale added dual nitrous bottles, dual gas cans and a custom roll bar to his Wild Willy. He also fabricated a driver figure that's a replica of his wife, complete with "navigational aid" (a map). Tommy's vehicle (military version) includes a custom roll bar and windshield and a hand-made Vickers machine gun.



Scott Dorner HPI RS4 Rally Petersburg, NY

Scott used to run 2- and 4WD buggies until he was hooked by the scale appearance of rally cars. Beneath the hood of this HPI RS4 are a Tekin G-10 ESC, Novak XXL receiver, a fully tweaked P2K and New Wave 2000s. Scott plans to add CVDs, ball diffs and a slipper clutch.



Guillermo Gayoso Kyosho Pure Ten Lima, Peru

Guillermo's Pure Ten won the 1998 and '99 Peruvian national championships. It's equipped with a NovaRossi engine, O'Donnell pipe, arms, chassis and pinions from Cross, graphite upper deck, MIP CVDs and Elegi tires. Guillermo guides his car with a 3PI PCM radio.



Readers' Rides

Danny Lam Kyosho SuperTen and Tamiya TGX

Victoria, BC, Canada

These four cars belong to Danny and a friend. Danny owns the Clarion Nissan R390 GTI. The Tamiya TGX with the blue Porsche body has an O.S. .12 CVX engine, 2-speed transmission, MIP CVDs and a tuned pipe; the other cars are stock.



Brian Murray HPI Nitro RS4

Rohnert Park, CA

This mean-lookin' machine is powered by an HPI .15 nitro engine. It has an MIP boost bottle, HPI tuned pipe with header, a 2-speed transmission and MIP clutch. The chassis consists of a countersunk chassis plate, HPI supershocks, MIP CVDs and swaybars, all topped off by a Ford F-150 body. The wheels are by RPM with HPI Pro-compound radial tires. An Airtronics servo and receiver control its movement.



Gil Eggleston HPI Nitro RS4

Fairbanks, AK

This sharp-looking HPI stock car features a Nitro Star .15FE engine; the body is a Protoform Pontiac. Gil based the body's design on NASCAR driver Ward Burton's car.



Nicholas Kulle Associated RC10T3

Aurora, IL

This T3 belongs to 13-year-old Nicholas. It features an LRP V6 ESC, Reedy Sonic 2 10-turn double motor and a Panasonic 3000 battery. Nicholas uses a Futaba 3PDF radio. A custom-painted Pro-Line Dodge Ram body completes the look. When he's racing, Nicholas installs a Reedy Firehawk motor.



Pit Tips

BY JIM NEWMAN

WIN A FREE ONE-YEAR SUBSCRIPTION! Radio Control Car Action will give a one-year subscription (or an extension of your existing subscription) for each of your ideas used in "Pit Tips." Send a sketch and description of your idea to "Pit Tips," c/o Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



Improved Cleaning Brush

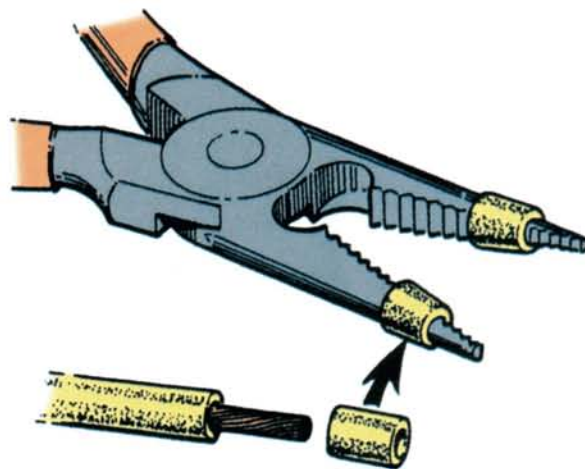
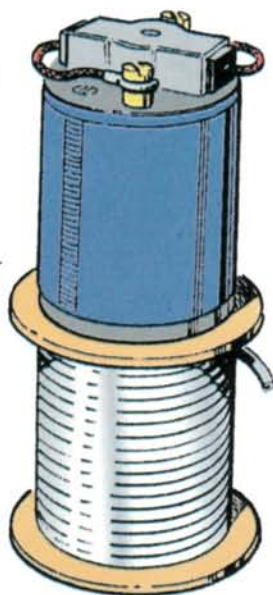
To make your cleaning brush more effective, trim the bristles on an angle. This allows you to reach stubborn dirt buildup on your chassis and suspension. Stiff, 1/2-inch-wide brushes work well for cleaning an entire vehicle.

DAVID ARGUELLO
McFarland, CA

Motor Holder

Here's a convenient way to hold your motor. Stand your spool of solder on end and place the motor on top. Now you can work on your motor without its rolling around on your workbench.

JERRY PHILLIPPE
Taylor, MI



Non-Damaging Pliers

To prevent damage to shock shafts and hinge pins when you hold them with pliers, cover the jaws with wire insulation.

PAUL BENNET
Spokane, WA

TOP TIP

WIN AN OFNA RALLY Z-10!

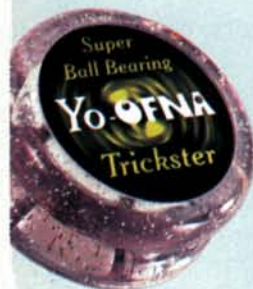
We need your best Pit Tips! If you have a fresh, original idea to share with your fellow readers, submit it today (follow the instructions given at the top of the page). If your tip is published, you'll win a Yo-OFNA yo-yo plus a one-year subscription to RC Car Action. If your submission is chosen as the month's Top Tip, you'll win an OFNA Rally Z-10 kit! You may submit as many unique entries as you like.



PIT TIP POINTERS

- Be original! We've seen body clips tied to the body with thread, film canisters for parts storage and spray caps as motor stands a hundred times. Think of new ideas!
- It's all right if your tip is very specific. For example, if your idea works only with one type of car or truck, that's OK!

- Anything related to RC is good. Your Pit Tip doesn't have to relate to a car or truck; it can be a suggestion for a way to become better organized, or a modification to support equipment such as toolboxes, starters and tools—anything RC!
- Send all your ideas! Don't hold back; you have nothing to lose!

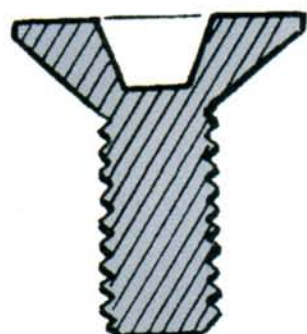
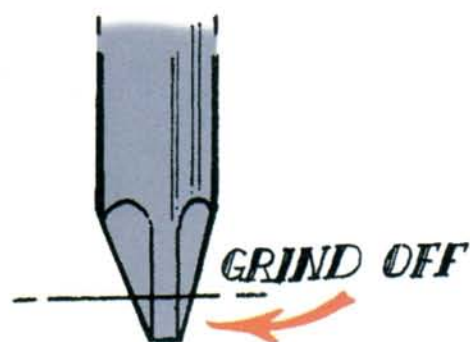


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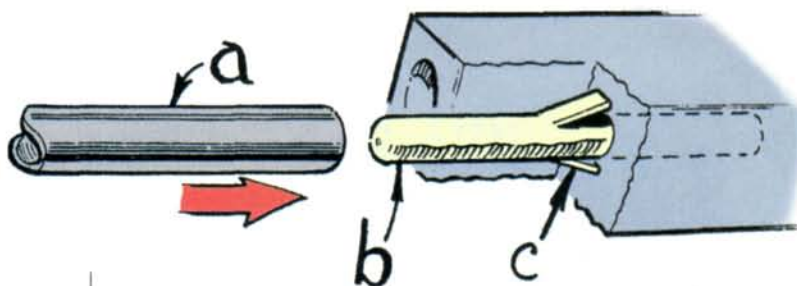
Pit Tips



Screwdriver Fitting

Screw heads are often stripped because the screwdriver tip doesn't fit into the slot all the way. Grind away a portion of the screwdriver's tip until it fits the slot in the screw head.

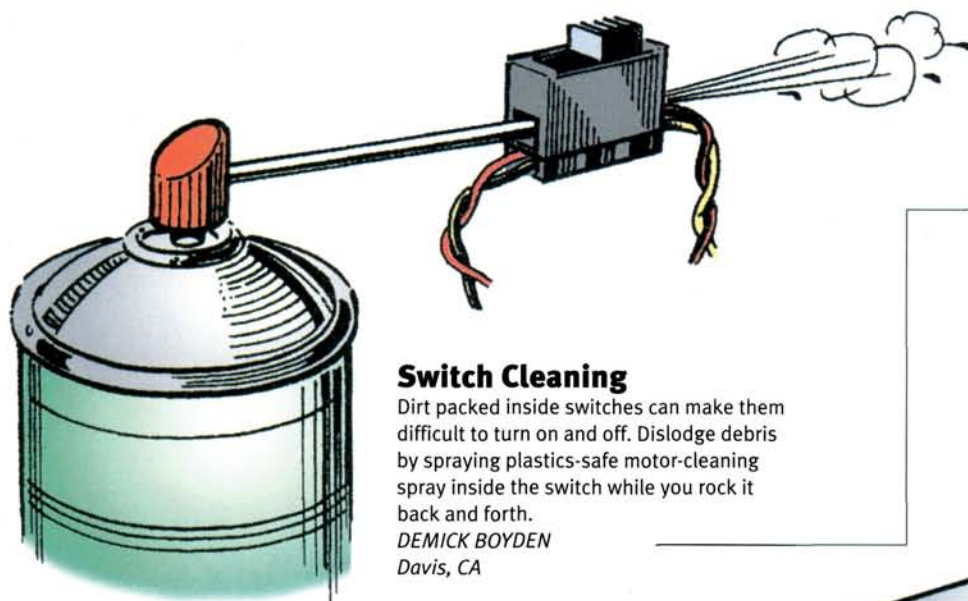
FRED CHING
Monterey Park, CA



Pin Connector Removal

Tamiya-style connectors tend to loosen when used often, and this can lead to problems such as connector meltdown. To avoid connector problems, replace them when you notice that they're worn. Use a small brass tube (available at most hobby stores) to extract the pin. Slide the tube over the pin; this will cause the barbs to collapse. Then slide the pin out by pulling on the wire.

HILARY GIERMAN
Columbus, NJ



Switch Cleaning

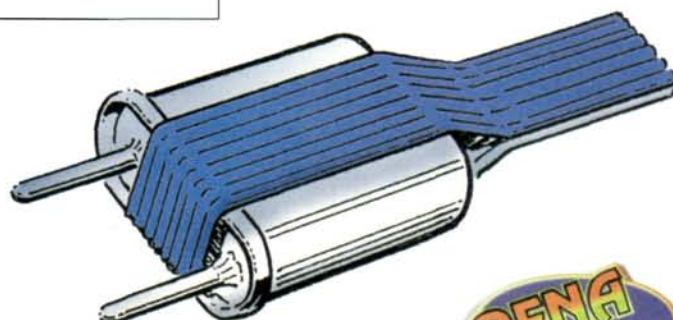
Dirt packed inside switches can make them difficult to turn on and off. Dislodge debris by spraying plastics-safe motor-cleaning spray inside the switch while you rock it back and forth.

DEMICK BOYDEN
Davis, CA

Crystal Pull Tab

If you frequently remove your crystals, their paper tabs may break off. Make a new tab by wrapping a piece of strapping tape around the crystal.

JON MCGILL
Tulare, CA



Troubleshooting

BY PETER VIEIRA • ILLUSTRATIONS BY JIM NEWMAN

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at *Radio Control Car Action*, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

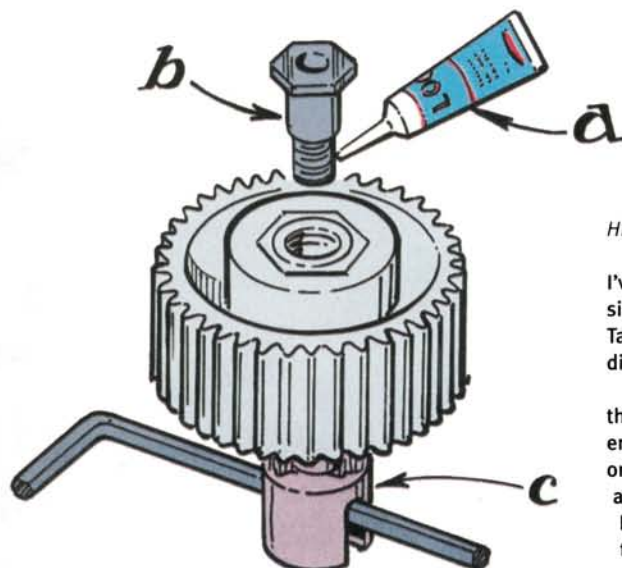
Runaway Maximum BX

I received a DuraTrax Maximum BX buggy as a gift. It ran great until just the other day when I was driving it on pavement and accidentally drove through a puddle. Then it took off on its own and got stuck in some grass and started to act funny. I shut it down and blew it off with our air compressor. Since then it has acted weird. When the engine is not running, the servos work fine and respond well. But the second I start the engine, the servos do "their own thing" and rev the engine and steer the car to the right with little twitches. I don't have any idea what is wrong.

ROBERT
Chelsea, MI

As you learned, water and electronics don't mix. Most RC electronics, however, will operate normally once they dry out as long as nothing shorted out or otherwise went "poof." Your receiver may not be damaged; to test it, take your buggy to the local hobby shop and ask whether they would be willing to plug a new receiver into the car to see whether it suffers from the same glitch as your original unit. If it doesn't, problem solved. If the buggy still glitches, unplug the steering servo, and see if the throttle still glitches, then unplug the throttle and plug the steering servo back in and see whether the steering servo glitches. If only one servo has the problem, open the case and blow out the moisture to fix it; if it still glitches, replace it.

If all the electronics seem OK, yet you still have a problem, move on to the engine and chassis. Look for any loose parts, frayed wires, or metal-on-metal contact areas. Tighten the loose parts, insulate exposed wires, and separate any metal parts that are rubbing together. Restart the buggy and see if the problem persists (place it on a block so it won't run away, if it turns out that you still have radio trouble). Chasing a glitch is never fun, but I hope my advice will help. Good luck.



Hummer Diff Trouble

I recently purchased the Tamiya Hummer. Building the model went well, but the rear differential keeps coming loose. This leaves me with only front-wheel drive. I have taken the diff apart after each run. After reassembly, 4WD works fine, but after a little while, I notice that only the front tires grip. What can I do to prevent this from happening? [email]

HECTOR S100

I've seen just about everything that can go wrong with Tamiya's Hummer and similar Manta Ray/TA01-2 cars, but I've never had a slipping rear diff. Tamiya's ball diff is oriented so that its rotation would tend to tighten the diff, if anything.

You say that you've rebuilt the diff a few times. Are you installing the thrust washers correctly? For the diff to operate properly, they must be properly stacked. Rebuild the diff one more time, paying close attention to the order and position of the parts. Before you install the diff nut (MA15), clean all grease off its threaded portion and apply a drop of medium-strength Loctite (the blue stuff). Tighten the nut fully, using an Allen wrench to hold the outdrive, as shown in the manual. The diff should stay tight.

Troubleshooting

Reluctant Rustler

I have a Traxxas Nitro Rustler with EZ-Start that is very hard to start. Once it starts, it is fine. It has a Pro 15 engine. I have tuned it and tuned it. Is there a hotter glow plug that might help? [email]

FRED ALRIC



Pull-starter-equipped engines require muscle power to start, and most modelers don't want to waste their time pulling if the engine isn't popping. On the other hand, the Traxxas EZ-Start electric starter requires no elbow grease, so many modelers just hold the starter button down until the battery pack dumps instead of trying to figure out why the engine isn't firing. You say the truck runs fine once started, so you don't need a "hotter" glow plug. You might need a better starter battery, however; the EZ-Start motor draws power away from the ignition wire that heats the glow plug. If your pack is "tired" or undercharged, it might not have enough punch to spool up the engine and heat the glow plug. As a test, try using a stand-alone glow-starter instead of the EZ-Start ignition wire; if the engine starts easily, you've found your problem.

TIM NEWMAN
3-007

Unequaled Precision

Absolute Series Spurs



Available in 48P in 80T thru 91T, this is the quietest spur you can buy! RRP 1780 - RRP 1791

B3 / T3 Lite Aluminum Outdrives



Blue anodized and 40% lighter than stock ball diff outdrives. RRP 1502

Absolute Series Pinions



Available in 48P in 18T thru 28T sizes. Super hard, lightened and cut unmatched precision. Great with any spur, but with an Absolute spur, even on-off noise is gone! RRP 1416 - RRP 1428.

Unsurpassed Reliability

Outstanding Performance

Associated Blue Lightened Slipper Kit

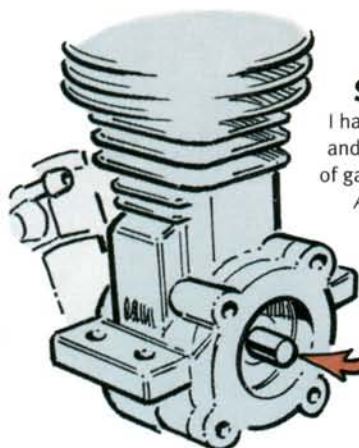


The rear plate is hard anodized to reduce wear and the front plate is color treated. The front plate is designed to hold the slipper pad forcing the pad to slip on the rear plate. When pad shows sign of wear just flip it over for a new surface. Metal parts are CNC machined for a flawless fit. RRP 1515

RC10-GT Gas Spurs



Super tough and precision machined from heat-resistant plastic, these spurs mesh flawlessly with our Clutch Belts. 32P spurs in 54T thru 67T, RRP 2261 - RRP 2267, and 32P bells in 14T (New) thru 24T, RRP 2214 - RRP 2224.



Slipping Pull Starter

I have a problem with my engine. The pull-starter's cord doesn't always feel as if it catches, and the piston doesn't turn over. When it does start—not very often—I can't run a full tank of gas without the engine's quitting. The engine is an O.S. 12 CV.

AUSTIN HALL

Bottineau, ND

It sounds as though the one-way bearing in the pull-starter has quit on you, but there is a chance that it may simply be gummed up with oil. Carefully disassemble the pull-starter, paying extra attention to the spring coiled inside it; you don't want it to uncoil. Notice the bearing that slides onto the part of the shaft left poking out of the engine; that's the one-way bearing. Remove it from the pull-starter (again, keep an eye on that spring), and give it a liberal spraying with Traxxas Nitro Wash or HPI Nitro Cleaner. Relube the bearing with a little oil, reassemble the pull-starter and see if it grabs. If it doesn't, I suggest you replace the entire starter.

As for your "won't-run" troubles: I need more information to make a diagnosis. When in doubt, replace the fuel lines and the glow plug, reset the needles to the factory recommended settings, fill the tank with fresh fuel, recharge your glow-starter, and try again. (Lost the manual? Try setting the low-end needle so it is flush with the carb body, then set the high-end needle two turns out from the fully tightened position.) ■



Superb Quality

RC10-GT Steel Combo



Precision machined one-at-a-time from a single piece of steel and then hardened this 65T spur and 15T bell combo will last and last. The extra-hardened clutch bell fits ALL Associated and MIP shoes. RRP 2365

Associated Titanium Stealth Top Shaft



CNC Machined from a single piece of titanium, this super hard, super light top shaft will fit any Stealth transmission. No serious racer should do without this part. RRP 1512.

Intelligent Innovation

RC10-GT Hardened Steel Idler Gear



Cut from solid steel stock, this gear is lightened and then hardened for super quiet precision and extra long life. Jamin' tranny grease is included. RRP 2213

Thoughtful Design

RC10-GT Hardened Diff Gear



Hard anodized, precision machined aluminum diff gear. RRP 1513



1999 World Cup and National Champion

"I only care about performance, and that's why I run Robinson Racing gears and slipper clutches exclusively."

—Richard Saxton



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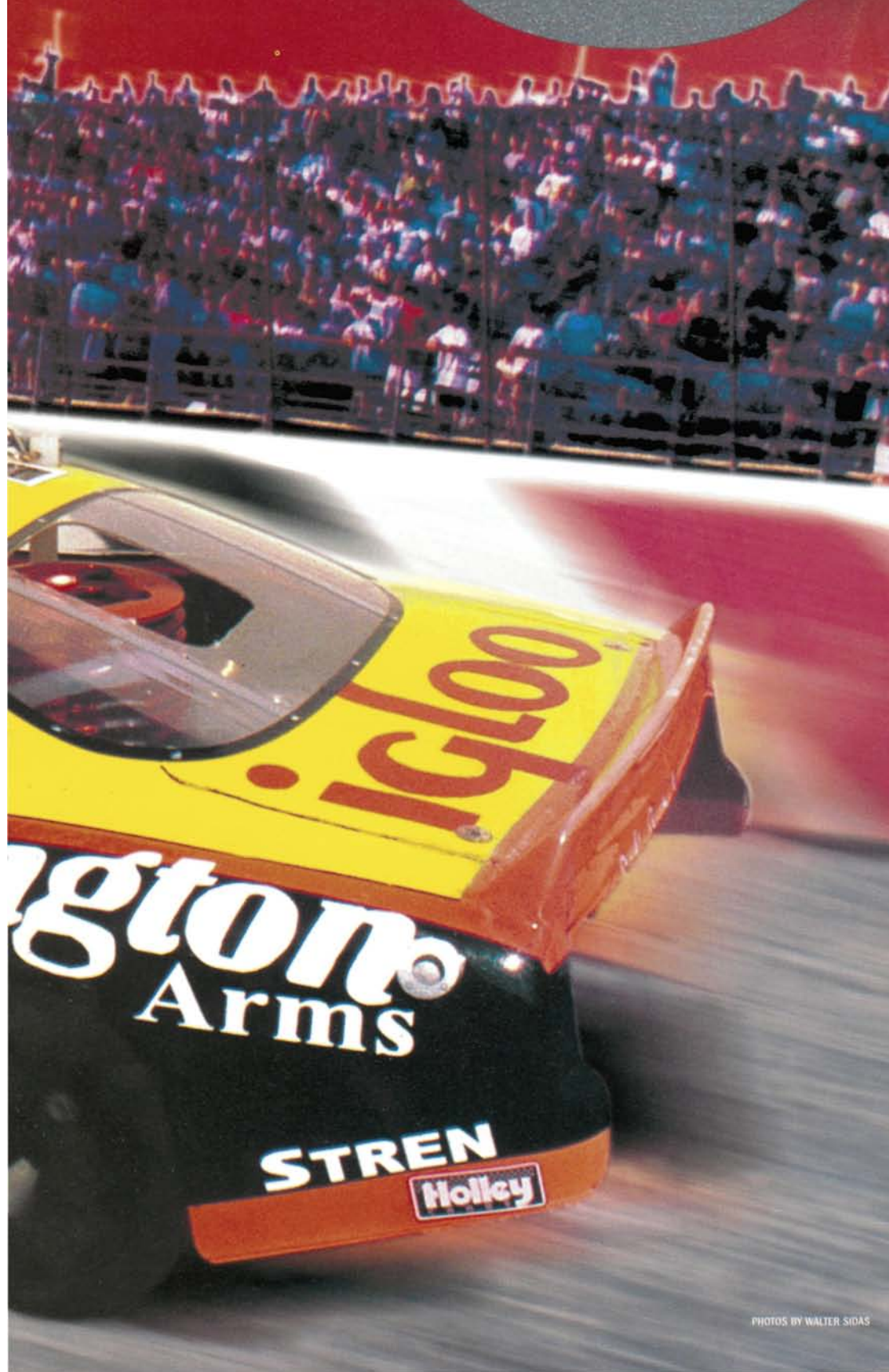
Bolink Nitro Racer

A noisy new way to turn left by Chuck Carter

The Bolink/Racetech Nitro Racer is taking the South by storm. Look at it this way: you arrive at the track, unload your toolbox, fill your fueling bottle and five minutes later, you're turning hot laps for the next 10 to 12 minutes. Then, there's no waiting for a pack to charge for the next long run; just refuel and enjoy another 10 or so minutes on the track. Sound like fun?

Bolink thinks so. No matter what you think of the current state of oval racing, the Nitro Racer is sure to shake up your LTO sensibilities. If you want an RC oval experience that's as fast and as loud as NASCAR, this is it.





DATA CENTER

VEHICLE TYPE 1/10-scale nitro-powered pan-type oval car

BEST BUYER Experienced nitro racers

KIT RATINGS (poor, satisfactory, good, very good, excellent)

Instructions Satisfactory

Parts fit/finish Good

Durability Good

Overall performance Very good

SPECIFICATIONS

SCALE 1/10 oval and on-road

LIST PRICE \$259.99

STREET PRICE \$191

DIMENSIONS

Length overall 18 in.

Wheelbase 10.4 in. (264mm)

Width (F/R) 7.4/7.9 in. (188mm/200mm)

WEIGHT

49.1 oz. (1,392g)

CHASSIS

Type Pan

Material G10 Fiberglass

DRIVE TRAIN

Type Direct drive pinion/spur gear

Differential Ball

Bearings Ball bearings

SUSPENSION F/R

Type Associated Dynamic Strut/T-plate and pod with VCS shock

TIRES (not included)

Type BSR Radials

Compound RF blue, LF red/RR green, LR narrow green

ENGINE AND ACCESSORIES (not included)

Type O.S. Max .12 CV std. (Sugarbowl spec. w/Associated .170 restrictor)

Muffler HPI (Sugarbowl spec.)

Exhaust pipe No. A870

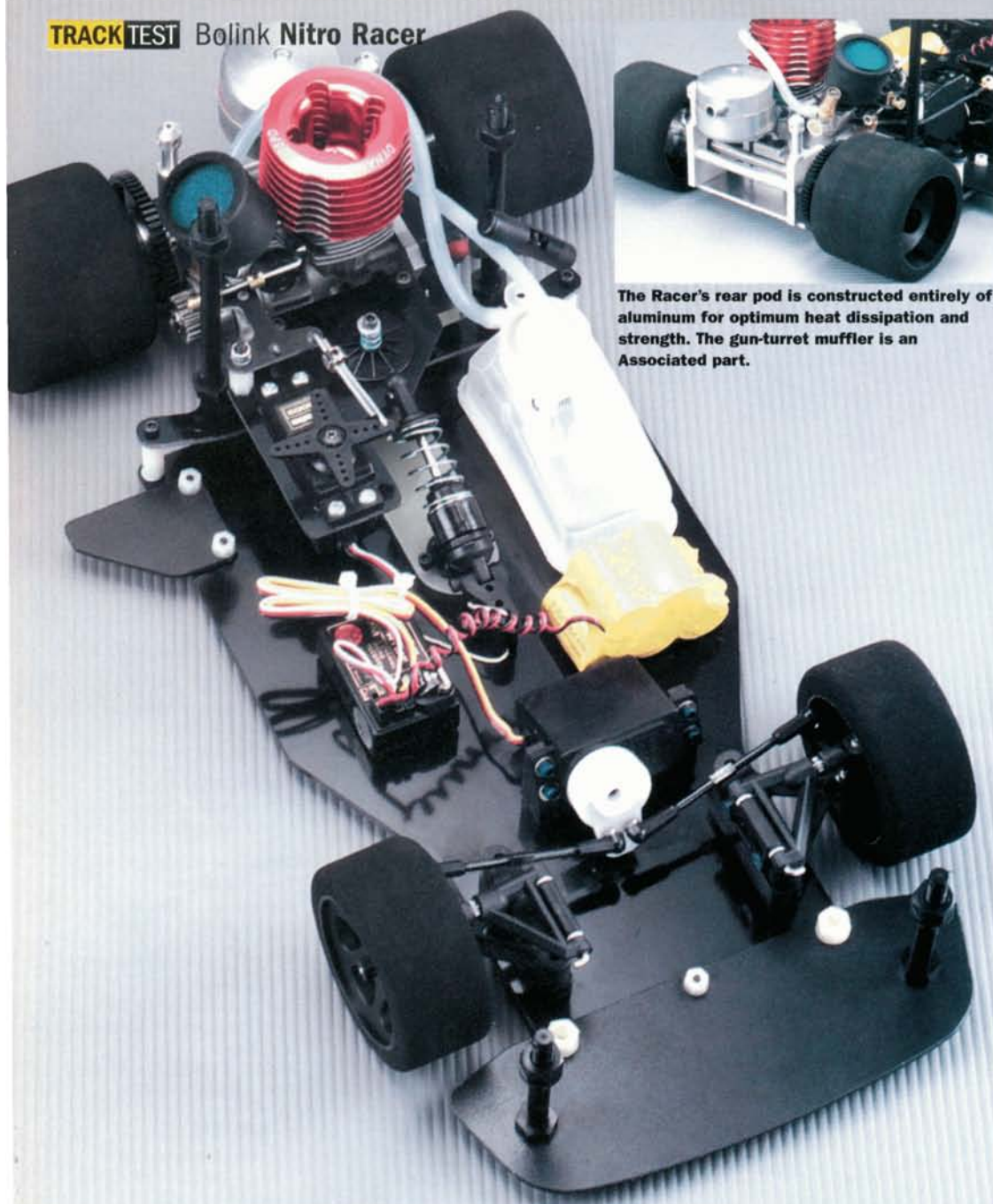
LIKES

- Simple, durable design
- Proven Dynamic Strut front suspension
- Plenty of hop-up potential

DISLIKES

- Instructions could be improved

PHOTOS BY WALTER SIDAS



The Racer's rear pod is constructed entirely of aluminum for optimum heat dissipation and strength. The gun-turret muffler is an Associated part.

building & setup tips

The Nitro Racer is a very simple machine, but don't assume you'll be able to breeze through the building without paying close attention to the instructions. This car is fast, and it deserves careful assembly for maximum performance and safety. Here are some tips to help you get to the track more easily and better prepared, and a few setup pointers, too.

Engine installation. Get an engine with a cut crankshaft. Go for one designed for a drop-in fit in the Associated RC10GT or Losi GTX/NXT; that will save you the chore of cutting it yourself. Keep this in mind, too; the Nitro Racer will be overpowered with just about any .12, so you may as well keep the convenience factor high and go for a pull-start powerplant. Also remember to use Loctite on the engine mounting screws. You knew that already, right?

Tire selection. If you can afford to spend a little extra on tires, get caps (rubber over foam). The Nitro Racer eats up foam tires quickly if you drive hard on pavement (and trust me, you'll want to). Foam tires may be cheap, but they get expensive when you tear through a set after every few tankfuls.

YOU'LL NEED ■ .12 engine (pull-start or bump-start) ■ Muffler ■ Clutch ■ Wheels and tires ■ Body (any narrow oval body will fit) ■ 2-channel radio system ■ Throttle and steering servos ■ Receiver battery.



The brass band-brake is rudimentary but effective. Off-the-shelf Associated clutch parts are shown but not included with the kit.

THE BIRTH OF NITRO OVAL

If nitro oval racing takes off, as I hope it will, RC fans are bound to ask how it all started. Here's the real story:

A few guys from Atlanta's Sugarbowl Raceway—the host track of the 1999 ROAR Paved Oval Nationals—were having their weekly post-race eats, when one of them suggested how much fun a nitro oval car would be. One of the guys had an old car that was nitro powered, but it was very fragile and didn't work very well. However, they were impressed enough to continue the experiment and tried again with Associated Dual Sports, but found the cars weren't up to the speeds they were after. Then, HPI's stock-car version of the Nitro RS4 arrived, and hobby shops everywhere sold them as fast as they could get them. However, the racers decided that the 4-wheel-drive system just didn't lend itself well to the rigors of turning left only. Well armed with the experiences of what *didn't* work, Randall Winslett took a few of his ideas to Rick Jordan at Bolink, who agreed to make the suggested parts to produce a workable nitro oval car. When the prototype was complete, Randall's brother Darrel was challenged to wreck the car. After 10,000 laps at the Sugarbowl, they felt they had a car that was durable—and fast. Just 2½ months later, the first kits were delivered—and here we are.

KIT FEATURES

• **Chassis.** The Nitro Racer's chassis is as simple as RC gets; it's just a slab of 3/32-inch black fiberglass, drilled to accept a T-plate and standard pan-car steering components. The chassis is fully counter-sunk (good thing, since the car has only about 1/8 inch of ground clearance), and holes are provided for the steering servo and fuel tank (and the other parts, of course). A Kydex nerf wing protects the right rear wheel, and a large Kydex front bumper lends extra-crash protection as it provides a home for the front body posts. The chassis' rear is stiffened by a fiberglass cross-brace that sports a pair of ears to hold the rear body posts.

• **Suspension.** The front suspension is the very tunable Associated Dynamic Strut used in almost every pan car made today. Rest assured, finding replacement parts won't be a problem. The Dynamic Strut design allows easy caster and camber adjustments, and it can be set for active or fixed caster.

The rear suspension's traditional floating pod/T-plate design comes complete with tweak screws. A friction disc system (like the old Associated 10L series cars) provides lateral damping, while bump damping is handled by an Associated VCS Macro plastic shock. The pod's upper plate is also home to the throttle servo mount. This setup allows the servo to move with the rear pod, so suspension action does not affect throttle or braking.



Bolink includes Associated's proven Dynamic Strut front suspension, shown here with inline axles. Spare parts (and hop-up options) are plentiful for this popular front end.

• **Drive train.** The entire drive train is built into the rear pod, which is constructed of aluminum to dissipate engine heat (and be strong as heck). Aluminum engine mounts are included, and small riser pads allow fitting of a pull- or bump-start engine. The Nitro Racer is slowed by a simple brass band-brake that presses a cork pad against the clutch bell. The rear axle is Bolink's familiar steel unit that has served on everything from the '91 Sport to the Legend cars. Machined aluminum hubs are standard, and the direct-drive ball differential operates smoothly. An included 32-pitch spur gear meshes with Losi or Associated clutch parts (not included).

• **Accessories.** The Nitro Racer is a chassis kit only and does not include wheels, tires, a body, engine, or clutch parts. However, a fuel tank is included.

PERFORMANCE

One word describes the performance of this car—*awesome!* I know it's trite, but there is no more apt description. Everyone who drives the car comes off the drivers' stand with a silly grin on his face, and it stays there for quite some time. It isn't possible to hold the throttle through the turns; you have to coast going in, and jab the throttle coming off, as the car screams and rockets down the straights.

One of the coolest things about this car has not even been mentioned—the sound! I never realized how much you miss sound when you run electric cars. They go whirring by with their zing, zing, zing; but this baby fairly screams around the track. This is a strong car, too; I've seen it take some big hits and come through with very little damage.

THE VERDICT

Crowds gather every time a field of Bolink Nitro Racers fire up. The real engine sounds alone are enough to make you grin, but watching a pack of 'em circle the banking is incredible to see—and even more thrilling to participate in, which I hope you will all do. It's all about having fun, and running the Bolink/Racetech Nitro Racer is the most fun I've had in a while. Try one; I think you'll like it.

*Addresses are listed alphabetically in the Index of Manufacturers on page 208. ■

Bolink '99 Taurus NASCAR body.

This slippery shape is a favorite among the LTO crowd, and since the Bolink Nitro Racer is just a big ol' pan car, the body is a direct fit. Just be sure to cut some ventilation holes in the windshield! I sent mine to Paintwerks* for a custom paint job.

O.S. Max .12 CV engine.

You might think of .12 engines as "little," but when you take a gutsy mill like the O.S.* CV and couple it to a lightweight pan chassis, the result is a power-to-weight ratio that tips the scales heavily to the power side of the equation. Imagine a moped powered by a hemi V8, and you'll have a pretty good idea of what I'm talking about.

BSR Radial tires.

In my opinion, no one makes a finer cap tire for oval racing than BSR*. Given the long run times and major speeds of the Nitro Racer, durable tires are a must, and BSR's are up to the punishment.

Airtronics Caliber 3PS transmitter and receiver.

The M8 gets all the attention, but my trusty old Caliber still has plenty of life left in it. Maybe if Airtronics* hadn't made it so reliable, I'd have that M8 by now!

Futaba S3003 steering and throttle servos.

Futaba's standard servos have plenty of strength for oval work, and the lightweight Nitro Racer doesn't require a lot of servo power to brake effectively.

Dynamite 5-cell RX battery pack.

There's plenty of room on the chassis for any type of receiver pack—from AA battery holders to 5-cell Ni-Cds. I went the Ni-Cd route for maximum convenience (and savings down the road; Energizers get expensive).

Editor's note: the author tested the Bolink Nitro Racer with the equipment listed. The photo car is equipped with a Dynamite 12SPD engine, Futaba and Hitec radio gear, Jaco tires and DuraTrax receiver pack.

SUGARBOWL SPEC RULES

If you'd like to run a class for Nitro Racers at your local track and want to keep the cost of competition down, I suggest you lay down some "spec" rules to keep everyone on a par with performance. Here's what we came up with for the Sugarbowl:

BODIES AND WINGS

Any ROAR-approved oval-car body and wing may be used.

Legal engines (must remain stock):

O.S. CV 12 (pull- or bump-start)

Dynamite 12 SPD (pull- or bump-start).

Engine may be rebuilt using stock, factory replacement parts only.

FUEL

Dynamite Blue Thunder 20-percent nitro only.

Track operators reserve the right to provide fuel for the race.

EXHAUST

All cars must run with an HPIA870 exhaust pipe with baffle in place.

FUEL TANK

The Bolink-supplied fuel tank must be used with fuel lines of reasonable length.

BRAKES/CLUTCH

All cars must have brakes in working order capable of stopping the car completely and holding it still at idle. Cars must have a working clutch that disengages at idle.

GEAR RATIO 17/60

ROAR 1/10 Electric Oval rules apply with the above exceptions.

We originally wanted the cars to lap the Bowl between the electric stock cars and the 19T mod class, but during the prototype stage, we found that the little O.S. Max engine had too much power, so we used Associated's .170 carburetor restrictors (the black ones). Even with restrictor plates (sounds like real NASCAR talk, eh?), they are turning 4.9- to 5.3-second laps. That's lightning fast!

**TRACK
TEST**
1/10-SCALE ELECTRIC

Schumacher Axis

Conventional? No.

Fast? Yes. by Robert Allgeyer





The folks at Schumacher are certainly stirring up the competition scene with their new lineup of cars. At the '99 IFMAR Worlds, they put their off-road car in the show, and recently they won the Stock and Mod Sedan classes at the ROAR On-Road Nationals. After having continually improved past designs, it seems as though they found the winning formula, and that brings us to their latest sedan, the SST Axis Pro. Could this new mid-motor car be a potential world champion? I gave the car a workout to find out.

DATA CENTER

VEHICLE TYPE 1/10-scale
competition electric touring car

BEST BUYER Experienced racer; an enthusiast who wants a fully tunable and high-performance car

KIT RATINGS (Poor, satisfactory, good, very good, excellent)

Instructions Good

Parts fit and finish Very good

Durability Very good

Overall performance Very good

SPECIFICATIONS

SCALE 1/10

STREET PRICE \$210

DIMENSIONS

Wheelbase 10.13 in. (257mm)

Width 7.48 in. (190mm)

WEIGHT

Total, as tested 51.36 oz.
(1,456.06g)

CHASSIS

Type Double-deck

Material Carbon composite

DRIVE TRAIN

Type Dual belt

Primary Pinion/spur

Drive shafts Plastic universals

Differential(s) Ball
Bearings/bushings Bearings

SUSPENSION (F/R)

Type Upper/lower wishbone

Damping Oil-filled, coil-over shocks

WHEELS

Type Schumacher Y-spoke wheels

TIRES

Type Slick street tread

ELECTRONICS

Transmitter Futaba 3PJ Super

Steering servo KO Propo
PDS-2143FET

ESC Novak Atom

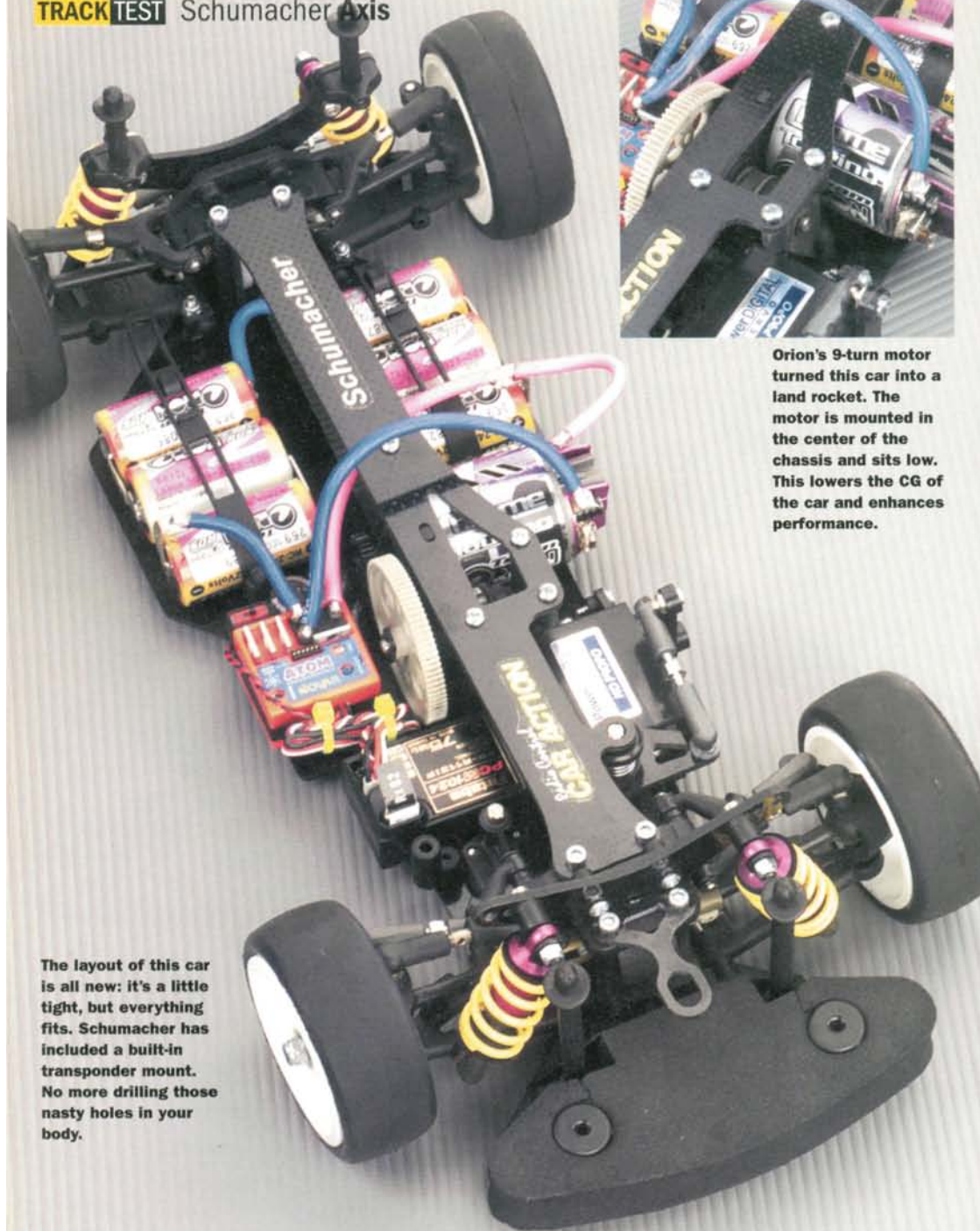
Motor 9-turn Team Orion
Touring Modified

LIKES

- Front transponder mount.
- Preassembled differentials.
- Many tuning options.
- Battery hold-down straps.

DISLIKES

- Motor-mounting screws are close to the rear drive belt.
- The speed controller and receiver are mounted too close to the spur gear.
- Left battery strap hits the outdrive.
- Pinion setscrew is hard to reach.



The layout of this car is all new: it's a little tight, but everything fits. Schumacher has included a built-in transponder mount. No more drilling those nasty holes in your body.



Orion's 9-turn motor turned this car into a land rocket. The motor is mounted in the center of the chassis and sits low. This lowers the CG of the car and enhances performance.

building & setup tips

I didn't encounter any real problems when building the kit, but I do suggest you use a high-quality Allen driver to install the cap screws that secure the top plate. They are very long, and difficult to install with the L-shape kit wrench. A Posi-type screwdriver is also a wise investment. Although a no.1 Phillips head will work, the correct tool (available from Schumacher) is far superior.

BUILDING

Chassis prep. Before you build the car, take the time to properly prepare the chassis. The edges and battery slots should be lightly sanded to knock off the sharp edges. This protects the turn marshal's hands when handling your car, and the smooth battery slots prevent the shrink-wrap on the cells being cut open.

Shock assembly. When you assemble the shocks, don't forget to install the oil-compensation foam. This is not pointed out very clearly in the instruction manual. Before installing the foam, soak it in shock oil and work the fluid into it thoroughly.

Damping. Shock oil is included with the kit, but I suggest you replace it with quality silicone shock fluid. You'll get better fluid, and since you'll know its viscosity, you'll have a reference point for tuning.

Rear toe. Stand the car on its rear tires, then use an RPM camber gauge to set the toe.

Front bumper. You'll quickly sacrifice the Axis's transponder mount if you don't run a front bumper, and your car's body will suffer too. The foam bumper shown is a Schumacher option part, and highly recommended.

YOU'LL NEED ■ 2-channel radio system with receiver ■ Steering servo ■ ESC ■ Motor ■ 190mm body and paint ■ 6-cell saddle pack ■ Battery charger ■ CA for the tires

FACTORY OPTIONS ■ Steel universal drive shafts; pin axle—Axis part no. U2155D ■ Alloy motor and layshaft mount—U2236E ■ Alloy lower/upper transmission housing—U1745Z/U2164U ■ Ultra-short spring-tuning set—U1921 ■ Ball-bearing set for diff center—U1419K ■ Tungsten carbide diff balls—U1414750

COMPETITION

	YOKOMO MR-4 PRO	ASSOCIATED TC3 (TEAM)	OFNA OB-4 PRO	SCHUMACHER SST AXIS PRO
Wheelbase	10.25 in. (258mm)	10.18 in. (259mm)	10 in. (255mm)	10.13 in. (257mm)
Width	7.44 in. (189mm)	7.44/7.48 in. (189/188mm)	7.3 in. (187mm)	7.48 in. (190mm)
Diff type	Ball	Ball	Ball	Ball
Chassis	Graphite composite	Molded tub	Graphite	Carbon composite
Available at*	\$219	\$219	\$249	\$210
Reviewed in	4/00	2/00	10/99	6/00

*Prices vary with location

KIT FEATURES

• **Chassis.** For the chassis plate and top deck, Schumacher uses the rigid S1 composite found on most of its other cars. The motor is in the middle of the chassis, and that requires a regular saddle-pack battery. To offset the weight of the motor and the three cells on the left side, the right-hand cells have been moved toward the outside of the car. Openings below the spur gear and the rear differential allow debris to drop out of the car instead of jamming up the works and cutting your race day short. Quick-change battery straps secure the battery, and battery removal is, literally, a snap.

• **Drive train.** When I opened the box, I immediately noticed the preassembled ball differentials; I was definitely pleased because I never fail to lose at least one diff ball whenever I build a kit. Inspecting the diff, I noticed aluminum outriggers that help to cut down the rotating mass. The diff pulleys are centered on the chassis, unlike other racecars that use offset diffs. To keep it centered, the drive train and belts run across the chassis at a slight angle. The diffs and the rest of the drive train ride on ball bearings.

The kit includes a 48-pitch, 86-tooth spur gear that is keyed to the layshaft, so you won't be able to use standard spur gears. (An adapter is available to use "standard" spur gears.) Plastic versions of Schumacher's Blade drive shafts are included (don't worry; the drive pins are metal). I've had very good luck with these drive shafts and was pleased to see them on the Axis.

• **Suspension.** The SST Axis' front and rear suspensions use wishbone-style arms. The upper and lower arms are connected to the hubs with pivot balls. The front end is fully adjustable; front caster is set by moving two spacers on the inside upper-arm hinge pin. Rear toe is adjusted via a pair of turnbuckles attached to the rear hub carriers, which are identical to the front carriers. Down-travel can be limited by using the setscrews in the lower suspension arms. The shock towers have been changed to position the shocks at a more upright angle. Schumacher includes its purple-anodized, ultra-short shocks with the SST Axis. They came with green shock oil that didn't look promising, so for better performance, I opted for the 80WT Schumacher silicone shock. The shocks come with one set of pistons that can be adjusted to four damping levels. Also included is a set of Schumacher's stiff yellow springs. You can preload the springs with the included spacers.

• **Steering.** Schumacher has changed the mounting position of the servo from that of its older car so

that the servo output shaft now faces outward, and the front of the chassis is narrower. The steering system is controlled by two bellcranks that have a built-in servo-saver. The drag link is also made out of S1 composite and has two mounting positions for the turnbuckles. The drag link is held in place by two ball studs for the optional turnbuckle mounts. The slight play in the steering can be eliminated by placing an O-ring under the outer turnbuckle ball cup.

• **Body, wheels and tires.** The Axis didn't come with a body, so I opted for the Schumacher Volvo Q8. Richard Muse of Motion Graphics* laid down a killer paint job for me. The body posts in the rear are mounted on the top of the shock tower, while the front body posts are mounted on the bumper. Schumacher included a set of its Y-spoke rims, which are wrapped in Schumacher's SST slicks that feel soft and sticky.



The chassis for this car is a new design. Notice the adjustable links for the rear toe; this car doesn't lack adjustability.

PERFORMANCE

To test the SST Axis Pro, I pulled the Team Orion Modified and bolted in a Mighty Motors* stock motor to compete in the stock touring class at R/C Madness in Enfield, CT. The indoor carpet track has some pretty tight turns—a true test for the car. Track owner Chris Marcy allows foam tires, so I cut down a trued set of Pro-Line* foams—purple in the front and pink in the rear. When I first drove the SST Axis on the track, with the stock setup, I found its handling nimble. During high-speed cornering, it didn't want to turn in too aggressively, so I put 1 degree negative toe-in in the rear, and this improved turning. I also changed the top shock-mounting location from the outer hole to the inner hole. Going down the back straight, the Axis accelerated very smoothly and quickly. Acceleration out of the corners was also impressive—in my opinion, a little better than Schumacher's previous cars. This car is very forgiving, and it screams to be thrown into the corners and driven on the edge.

THE VERDICT

Having spent most of the indoor season behind the wheel of an SST '99, I never thought I would be so eager to switch to a new car. But after one race day with the Axis, my mind was made up. The Axis is not only capable of winning races but is also fun to drive. The mid-motor layout is unconventional, but there's nothing unusual about the ride. Don't overlook the Axis if you're still searching for a competitive tourer.

*Addresses are listed alphabetically in "Featured Manufacturers" on page 208. ■

Futaba 3PJ Super

Futaba's* newest controller, and probably my favorite, has everything anyone would ever need except an autopilot. The 3PJ Super has an 8-model memory. If you have more than eight RC vehicles, Futaba sells an extra memory chip that holds eight more.

Novak Atom ESC

The Atom is Novak's* smallest ESC, yet it's fully programmable. It is perfect for touring cars where you are short on space.

KO Propo PDS-2143FET Power Digital Servo

This servo from KO Propo* is the fastest I've ever owned. Its response time is 0.08 second/60 degrees; the servo puts out 8 kg-cm of torque and weighs 54.5 grams.

9x2 Team Orion Chrome Touring Modified

The Team Orion* Chrome Modified uses the latest in motor technology, from epoxy balancing to the capacitors that are molded into the endbell.

Orion 2400mAh batteries

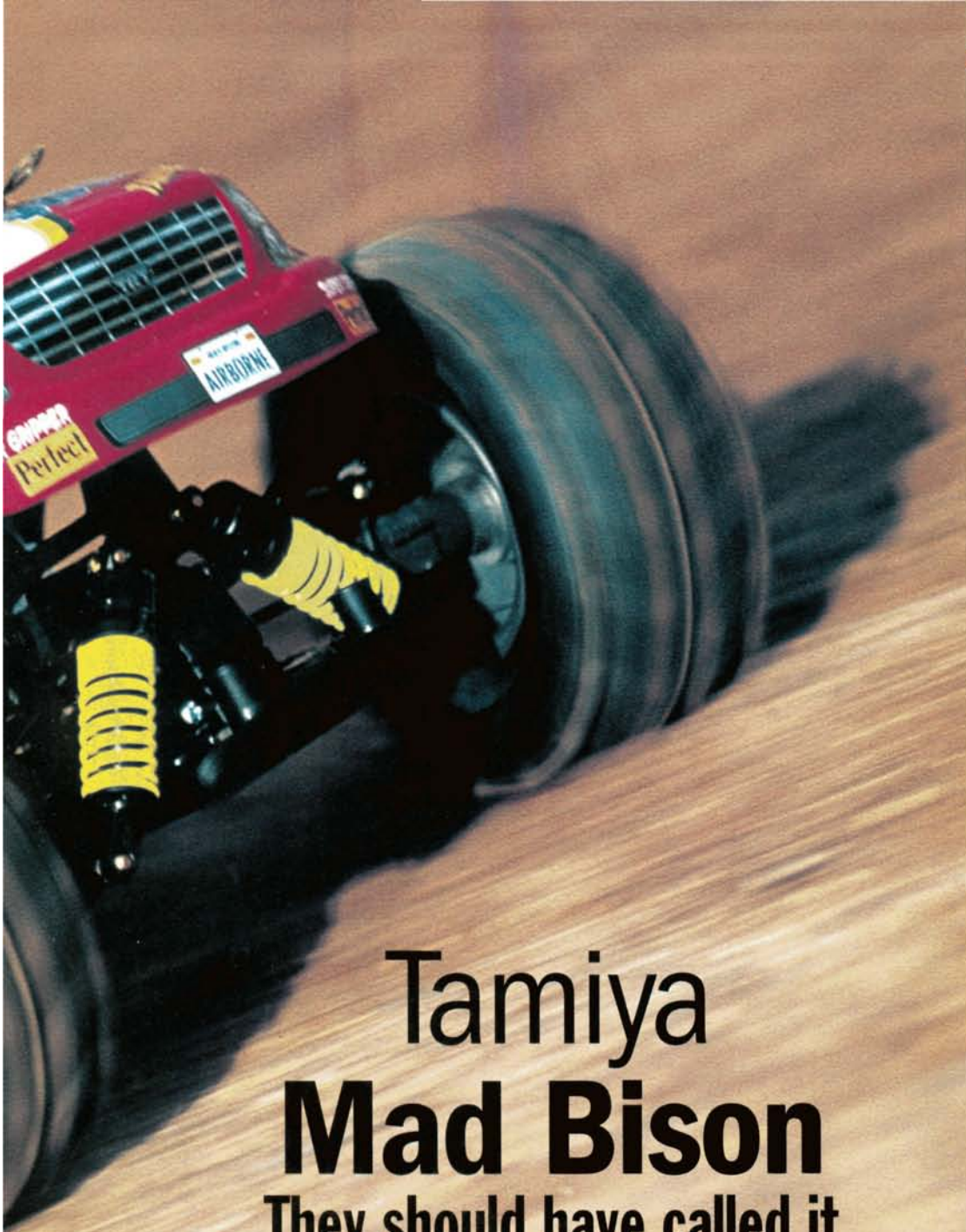
These are the latest from Orion. They offer long run time and lots of power.

Schumacher Volvo body (U5067V)

This kit does not come with a body. I chose Schumacher's Volvo body for the car. The paint job was laid down by Richard Muise of Motion Graphics.

**TRACK
TEST**
1/10-SCALE NITRO





Tamiya Mad Bison

They should have called it
"Nitro Blackfoot"

by George M. Gonzalez

It's impossible to talk about RC monster trucks without mentioning Tamiya*.

The Clod Buster is arguably the most popular monster truck of all time, and the Blackfoot—and more recently, the King Blackfoot—has introduced the hobby to thousands of racers. When it comes to monster trucks, Tamiya has one of the most extensive product lines, but for some reason, a nitro-powered rig has been absent from the company's stable of big-wheel monsters—until now. Enter the Mad Bison, a monster truck with shaft-driven 4WD, large-diameter, monster-truck tires and a powerful, .15-size engine that's fed by a large-capacity, 85cc fuel tank. The Mad Bison appears to have what it takes to live up to its unusual name. So, is the Mad Bison a wild bull or a sheep in wolf's clothing? Turn the page to find out.

DATA CENTER

VEHICLE TYPE 1/10-scale, nitro monster truck
BEST BUYER Monster truck enthusiasts; anyone looking to get started in gas

KIT RATINGS (Poor, satisfactory, good, very good, excellent)

Instructions Excellent
Parts fit/finish Excellent
Durability Excellent
Overall performance Good

SPECIFICATIONS

SCALE 1/10
LIST PRICE \$585
STREET PRICE \$379

DIMENSIONS

Width (F/R) 12 1/4 in. (313mm)
Wheelbase 10 1/16 in. (262mm)

WEIGHT

Gross (RTR) 81.5 oz. (2,250g)

CHASSIS

Type Double deck
Material (lower/upper) Duralumin/molded

DRIVE TRAIN

Type Shaft-drive 4WD
Primary Pinion/coungergear
Drive shafts Dogbones
Differentials Bevel gear
Slipper clutch None
Bearings/bushings Sealed bearings; metal bushings

SUSPENSION

Type Lower suspension arm with adjustable upper link
Linkage Threaded rod
Damping Oil-filled, coil-over shocks

WHEELS

Type One-piece plastic
Dimensions 2.2x2 in.

TIRES

Type Hard-compound, chevron-spike

ENGINE AND ACCESSORIES

(included)
Engine Tamiya FS-15LT
Carburetor Single-needle barrel
Manifold Flat canister muffler
Pipe Silicone exhaust tube

ELECTRONICS (not included)

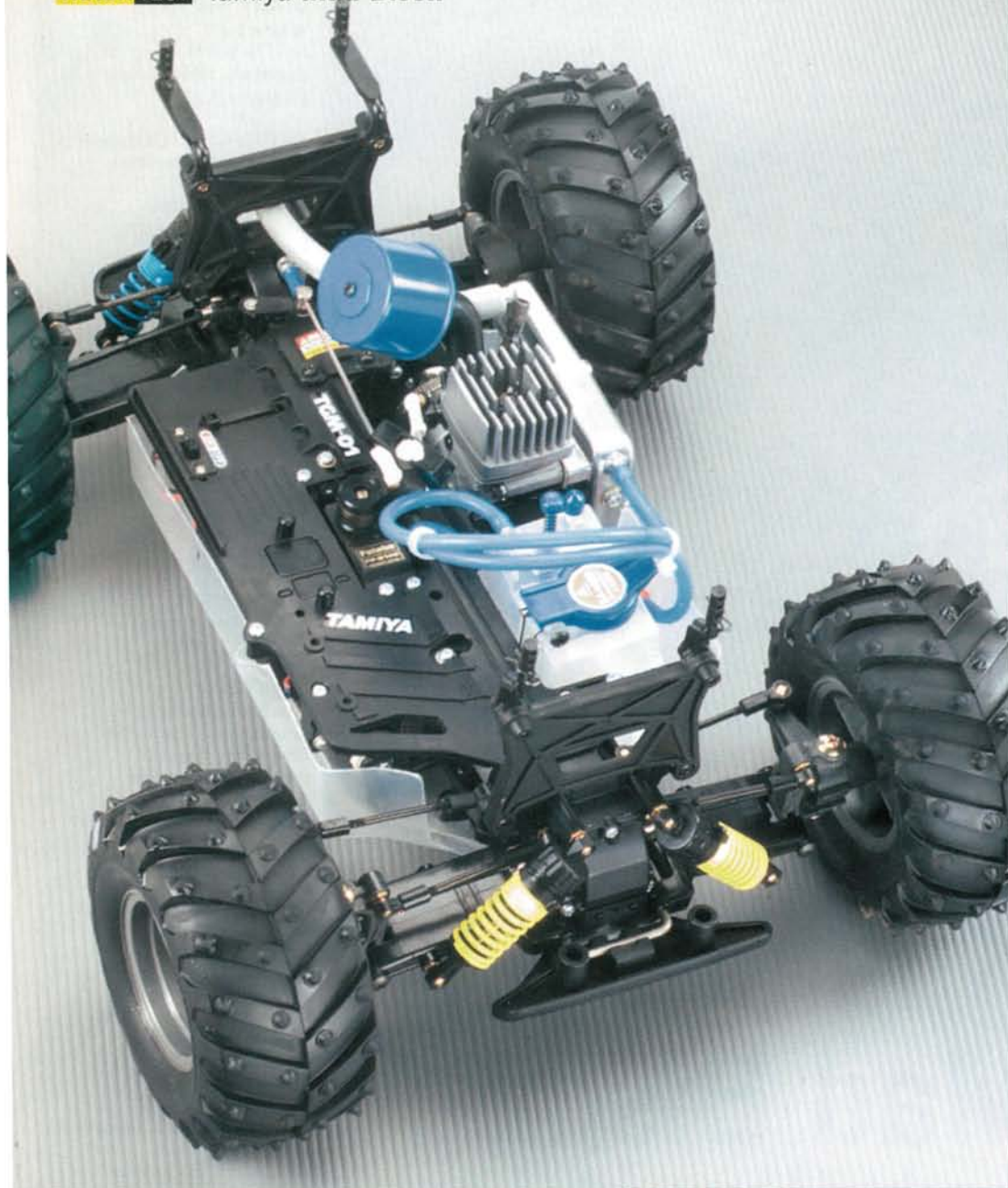
Transmitter Hitec Lynx FM
Receiver Novak NER-3FM
Steering servo Airtronics 94102
Throttle servo Futaba FP-S148

LIKES

- Excellent instructions.
- Easy to build.
- Fast, reliable engine.

DISLIKES

- Countergear cover bottoms out on occasion.
- Truck is severely under-damped.



Above: the long front suspension arms and deeply offset wheels give the Mad Bison its wide stance. The steering knuckles and C-carriers are molded of a new, rigid material. I added TGX medium Yellow springs and 80WT silicone oil to the shocks to aid in the damping department. Gotta love those meats!

Right: even longer suspension arms are found in the back. Hard steel dogbones and chrome-plated drive axles transfer the power to the ground. Check out the upper links that allow camber adjustment. I had to doctor the shocks by adding TGX firm Blue springs and 80WT shock oil back here, too.



YOU'LL NEED ■ 2-channel radio system with receiver and two servos ■ 12 "AA" batteries (Ni-Cd or alkaline) for the transmitter and onboard radio system ■ Glow-plug igniter ■ Fuel ■ Fuel bottle ■ Polycarbonate-compatible paint for the body ■ CA glue for the tires.

FACTORY OPTIONS ■ Low-friction aluminum damper set—part no. 53155 ■ FS-15 oversize heat-sink head—41009 ■ TG10 ball-bearing set—53352 ■ Hard joint cup set—53218 ■ Aluminum engine mount—53242 ■ Reinforced propeller shaft—53381 ■ Aluminum racing steering set—53365

building & setup tips

Tamiya's instruction manuals are the best in the business. Follow the directions closely, and your truck will be ready for hours of backyard bashing fun. Here are a few tips to make building and operating the vehicle even more enjoyable.

BUILDING

Step 1, page 4. Use plenty of grease inside the differential housings. If possible, pick up another tube of grease and completely fill both diff housings with the lube. This will slow down the diff action and improve the truck's handling.

Step 9, page 6. Installing a thin, 4mm axle shim over the MA22 countergear shaft will remove all the play and prevent the countergear from moving back and forth.

Step 20, page 10. Be sure to install the L2 shock pistons (molded on a separate tree) in the rear shocks and the V-8 pistons in the front shocks. The pistons may look the same, but the L2 shock pistons have a slightly smaller valve diameter to make the rear shocks stiffer. Use a caliper to precisely cut the rubber tubing into 8mm sections, or the truck will jump unevenly.

Steps 26, 27 and 28, pages 12 and 13. Be sure to apply a drop or two of liquid thread-lock on every screw that threads into metal.

Step 37, page 18. Go ahead and glue the tires to the wheels, even though the instructions say not to. Having the tires slip on the wheels for a moment does help remove some drive-train stress, but after the wheels get dusty, the tires will start to slip excessively and the vehicle's performance will suffer.

SETUP

Shocks: To better plant the truck over rough terrain, I filled up the shocks with Team Losi® 80WT, certified shock fluid and replaced the stock, relatively firm black springs with a set of TGX tuned springs. Yellow (medium) springs went up front, and Blue (firm) springs were installed on the rear shocks. I also installed Maxtec® foam body-mount spacers on the body posts to prevent the body from vibrating excessively.

Camber: The short-wheelbase Mad Bison can use some help in the stability department. A bit of negative camber adds stability when cornering, but don't overdo it or you'll make the truck unstable when it tackles bumps and jumps. A little toe-out can help, too; approximately 1 degree will improve on-power steering.

KIT FEATURES

• **Chassis.** The Bison features Tamiya's new TGM-01 chassis, which is basically a TG-10 Mk. 1 touring-car chassis that has been modified for off-road duty. A molded upper deck houses the steering and throttle servos, receiver and receiver battery pack and can be quickly removed for maintenance. The upper deck and 2.5mm-thick duralumin lower chassis plate join together to form an extremely rigid foundation. The lower chassis plate is not countersunk, but the molded front and rear bumpers and polypropylene under-cowl protect the screw heads from scraping on the surface.

To allow the counter gear (2:1 reduction gear) to protrude through the chassis, the chassis has a large, machined opening, and another opening under the flywheel allows the engine to be bump-started, if necessary. A molded gear cover that attaches underneath the chassis is provided to protect the counter gear from the elements, but it hangs below the chassis like an appendage. It's certain to bottom out after landing off jumps and driving over obstacles, but I'll reserve judgment until the performance evaluation.

• **Drive train.** The Bison's smooth, shaft-driven 4WD system features identical front and rear sealed gearboxes that house identical bevel-gear differentials. A solid-steel propeller shaft links the two gearboxes via drive dogs and cast-aluminum ring-and-pinion gears that are installed in each gearbox. A conventional caliper brake system with high-quality, fiber-brake disc is included. Hardened steel dog-bones and chrome-plated drive axles transfer the power to the wheels, and the kit includes rubber-sealed bearings for most of the drive train and metal bushings for the wheel hubs and the two propeller-shaft bearing caps.

The TG-10 drive train has a 1:8.1 final gear ratio that's ideal for smaller touring- and rally-car wheels and tires. With its large-diameter, monster-truck tires, a much lower gear ratio is required to motivate the Bison, though. Installation of a bearing-equipped counter gear between the clutch bell and spur gear will lower the vehicle's final gear ratio to 1:16.1—much more suitable for a monster truck.

• **Suspension.** Extra-long, two-piece suspension arms extend from the chassis and give the Bison an extra-wide stance. The Bison's wheelbase has also been extended 5mm, but at 262mm, it's still very short for a monster truck. To allow camber adjustment, threaded rods are included for the upper links; threaded steering links allow front toe adjustment.

Oil-filled, coil-over, plastic-body shocks are provided, but they're the same short-bodied bouncers that are included with many of Tamiya's

touring- and rally-car kits. Slightly longer shock shafts add a little more suspension travel, but travel limiters must be installed on the outside of the shock shafts to limit up-travel so the gear case won't bottom out on the track surface.

I was impressed, as usual, with the fit and finish of all the molded parts; several composites are used to add strength or rigidity where it's needed on the suspension. Additionally, the Bison's front steering knuckles, C-carriers and rear hub carriers are molded from a new, high-fiber, gray composite that I suspect will be used extensively on the company's soon-to-be-released TA04 dual-belt touring car. High-tech stuff!

• **Powerplant.** Tamiya's reliable FS-15LT engine is included, and it has the necessary grunt to motivate Bison through all kinds of rough terrain. The engine is a high-quality unit that features dual crankcase bearings, a bushed connecting rod and a single-needle barrel carb. The engine also includes a robust pull-start mechanism and a wet-type air fil-



Tamiya's FS-15LT engine is reliable and fast. Check out the flat canister muffler. Even with the body on the truck, the flat muffler is visible, and it looks pretty cool.

ter that's designed for high-moisture applications.

An interesting-looking, flat canister muffler and long silicone exhaust tube are included to route the exhaust toward the back of the vehicle. This type of exhaust system may not be as efficient as a tuned

exhaust system, but it does a nice job of deflecting the exhaust fumes and unburned fuel away from the tires and chassis.

A simplified throttle and brake-linkage system is included to make the radio setup process easy for beginners. A two-piece servo-saver with metal tension band eliminates the need for complicated take-up springs and speeds up radio installation. The engine includes a chrome-plated flywheel, ball-bear-



Hitex* Lynx FM transmitter. This radio system has a long signal range and operates virtually glitch-free, thanks to its clean FM reception. The radio also features throttle and steering dual rate and throttle endpoint adjustments that allow you to set the trims easily and accurately. For the money, it's hard to beat this affordable FM radio system.

Futaba* FP-S148 and Airtronics* 94102 servos. Since most hobbyists will probably opt for a budget radio system, I wanted to see whether a pair of standard servos would be able to keep the Bison in control. The servos operated the model faithfully, but a high-torque steering servo would undoubtedly improve the vehicle's steering response.

Novak* NER-3FM receiver. From my hodgepodge of radio gear, I selected this classic Novak receiver that has been in service for nearly five years. The unit is still able to lock onto a signal and provide glitch-free operation. Novak has a reputation for designing products that last.

Traxxas* Top Fuel (20%). When it comes to choosing nitro fuel for my models, I always stick with the name brands. Traxxas fuel has powered many of my nitro vehicles, and I've gotten great results every time.



A protective polypropylene under-cowl keeps the drive train free of debris and prevents the screw heads from scraping on the surface. The counter gear cover kinda hangs out there, but fortunately, it's bulletproof.

TRACKTEST Tamiya Mad Bison

ing-equipped clutch bell, an easy-to-install, two-shoe clutch, clutch nut, fuel line and 85cc fuel tank with quick-fill lid and priming button. In addition to the usual wheel nut and 2.5- and 1.5mm, "L"-shaped Allen wrenches, an 8mm clutch-nut wrench and a long glow-plug wrench are included; nice touch.

• **Wheels, tires and body.** The Bison's aggressive, chevron-spoke tires are the same off-road meats as are found on the King Blackfoot and Wild Dagger monster trucks. The gray, offset spoke wheels are from the Wild Dagger as well, and they nicely complement the Bison's paint scheme. The tires are taller than most 2.2-inch racing-truck tires; they increase the truck's ground clearance and provide additional shock absorption, which helps compensate for the lack of suspension travel. The tires are molded of a long-wearing compound, but running the vehicle on asphalt will quickly wear down the spikes molded into the chevron paddles. The truck body is also borrowed from the Wild Dagger, but a completely different decal sheet gives the Bison its own unique look.

PERFORMANCE

Right off the bat, I was impressed by the incredible power the little Tamiya engine has on tap. Off the line, the Bison is a bullet, and it's no slouch at the top end either; its top speed is 32.3mph. The large-diameter tires and 4WD traction got it through some fairly rough terrain, but I felt that the truck could have gone about its business with a little less melodrama. Basically, the Bison bounced over even small bumps, and that caused the body to vibrate excessively and make an annoying racket that could be heard over the engine sounds. The gear case bottomed out occasionally, but it wasn't as much of an issue as I thought it would be.

On the smooth stuff, the truck stayed planted at all times and

was extremely manageable despite the abundance of power. The tires work well on grass, gravel and loose dirt, but they work almost *too* well on asphalt. I sent the Bison cartwheeling down my street after taking a sharp corner too quickly. Fortunately, the truck survived the wreck, and I was able to conclude the "durability" portion of this Track Test.

I took the Bison back to my workbench to see whether I could do anything to the suspension to prevent the truck from bouncing over obstacles. Heavier shock fluid and a spring swap helped (for details, see "Building and Setup Tips"). The modifications allow the truck to absorb bumps and jumps instead of bouncing over them. The gear case still bottoms out on occasion, but the problem is a minor one now. I'm already thinking of ways to further improve the truck. Hmm ... I just might make the Bison the subject of my next "Project" article. Stay tuned.

THE VERDICT

The Bison is an easy-to-build and -maintain monster truck that's fun and exciting to drive. After operating the Bison, I began to reminisce about the days when I ran my highly modified Blackfoot monster truck for hours at a time. My front yard became an imaginary desert where big-wheel trucks ruled the terrain. Tamiya should have called this truck the Nitro Blackfoot because most hobbyists would immediately know what it was all about. The Mad Bison is not about stopwatches or lap times; it's all about fun. If you're looking for a fast, reliable, all-terrain vehicle to tear up your backyard, don't overlook this monster sleeper.

*Addresses are listed alphabetically in "Featured Manufacturers" on page 208. ■

Debbie's
RC
WORLD



Novak
CYCLONE \$119.99
Part #1765



CYCLONE TC \$119.99
Part #1765

GS STARTER BOXES
Part #GS5000011SL
(Silver) **\$89.99**

(Purple)
Part #GS000010PR

OS .21 ENGINE RZV99B (P)
Part #OSMG2064
\$269.99

DRCW
2200 Commerce Parkway
Va Bch, Virginia 23454
Tel: (757) 340-6681 • Fax: (757) 340-6084
• E-mail: drcw@pinn.net • www.debbiesrcworld.com



Kyosho Ultima ST Type R EP

Can this special K wake up the competition? by Greg Vogel

Electric truck racing has always been dominated by Losi and Associated. Although Traxxas should be praised for its racing efforts back in the day (remember Rick Vehlow?), at the national level, Associated's "T" series and Losi's "X" trucks have been unbeatable forces. Kyosho* is out to change all that, with national-caliber driver Greg Degani and a new electric truck that will make you forget the Outlaw and Pro XR-T. The truck's name will stir memories: Kyosho has revived the Ultima nameplate for its newest race machine (as you may recall, Kyosho's greatest successes in electric off-road racing came with the Ultima buggy back in the '80s). But there's nothing Reagan-era about the Ultima ST Type R; this truck is state of the art. After a "First Look" and an all-too-brief drive for the March issue, I'm happy to have been able to wring out the Type R fully for this "Track Test." Check it out.



DATA CENTER

VEHICLE TYPE 1/10-scale, electric, 2WD, off-road, race truck

BEST BUYER Racers and enthusiasts interested in top-level racing equipment

KIT RATINGS (poor, satisfactory, good, very good, excellent)

Instructions Good

Parts fit/finish Very good

Durability Very good

Overall performance Very good

SPECIFICATIONS

Scale 1/10

List price \$249.99

DIMENSIONS

Wheelbase 11.6 in. (284mm)

Width 12.4 in. (315mm)

WEIGHT

RTR 64.8 oz. (1,837g)

CHASSIS

Type Molded tub

Material Composite plastic

DRIVE TRAIN

Type Gearbox

Primary Pinion/spur

Drive shafts Universals

Differential Ball

Bearings Yes

SUSPENSION (F/R)

Type Lower arm with adjustable upper link

Damping Dual-cap oil-filled coil-over shock

WHEELS

Pro-Line Velocity

TIRES (F/R)

Pro-Line ribbed/Bow Tie T

ELECTRONICS (not included)

Transmitter Airtronics Super Exzes

Receiver Airtronics

Steering servo KO Propo

ESC LRP V6

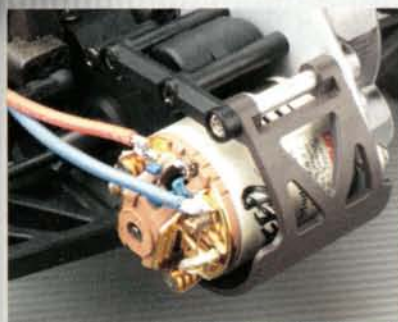
LIKES

- Ready availability of replacement rims.
- Diff uses American balls and rings.
- Dual-cap shocks.
- User friendly; easy to adjust.

DISLIKES

- Diff is not externally adjustable.
- Brown parts; what's up with that?

TRACK TEST Kyosho Ultima ST Type R EP



The motor is protected by this plastic cage. Notice the bulkhead and the number of tuning options for the upper camber link.

building & setup tips

BUILDING

Suspension. Two ball cups of different sizes are used on the turnbuckles. Be sure to pay close attention to the instructions.

Differential. The kit includes decent grease for the diff balls, but no thrust bearing grease. I assembled the diff with Associated's black lube on the thrust assembly and clear stuff on the diff balls.

Transmission. The diff outdrives fit the gearbox halves loosely, so before I slid the bearing in, I stuck a small piece of electrical tape in the gear case recess; this prevents the bearing from spinning in the case.

Shocks. The "Dual Cap" shocks can be built like Associated or Losi shocks. Build as you prefer, or just follow the supplied instructions. I chose to build "Losi style", and filled the shocks from the bottom.

SETUP

Before you start to tune the suspension, I suggest that you stick with the stock setup and work with tire changes to get your truck dialed to your track. My final setup for this track was 30WT Losi* Certified Oil in all four shocks and Associated* green springs (without inside or outside shock limiters).

I left the front turnbuckles in their stock positions: set to give the front end -1 degree of camber. I didn't really change the rear settings too much: the rear hubs had already been set in the center of the arm, and the upper turnbuckles had been set at -1 degree of camber.

To maximize front and rear traction, I separated the battery cells with foam in the center.

YOU'LL NEED ■ 2-channel radio w/receiver ■ Steering servo ■ ESC ■ Motor ■ Battery ■ Charger ■ Paint ■ Glue

COMPETITION

	KYOSHO EP ULTIMA ST TYPE-R	TEAM ASSOCIATED T3	TEAM LOSI TRIPLE-Xt
Wheelbase	11.6 in.	11.5 in.	11.4 in.
Width	12.4 in.	12.5 in.	12.5 in.
Weight	64.8 oz.	61.25 oz.	64 oz.
Diff type	Ball	Ball	Ball
Chassis	Composite tub	Composite tub	Composite tub
Street price*	\$249.99	\$184.99	\$199.99
Reviewed in	06/00	01/98	05/00

*Prices vary with location.

KIT FEATURES

• **Chassis.** The chassis has three sections: the main chassis, a nose plate and a tail plate. The main chassis is a composite semi-tub that has a slightly U-shaped cross-section to provide more cornering clearance on the sides while holding the battery as low as possible. Strategically placed braces make the plastic feel as strong as steel. The servo sits just in front of the battery and is easily accessible, while the receiver and ESC are on either side of the battery.



Bet you won't lose this battery hold-down; it's hinged to the rear bulkhead. Foam spacers allow the battery to be moved fore and aft on the chassis.

The nose section is a composite plate with a separate bulkhead and kick-up molded in. The bell-crank-style steering with built-in servo-saver is bolted directly onto the plate. The saver features a knurled knob to adjust tension for weak servos that are more prone to breaking.

On the cool side, the battery strap is hinged to the rear bulkhead so it's impossible to lose in the pits. Not so cool is the molded plastic bar's color—brown!; I have a huge craving for a chocolate bar every time I see it.

Finally, the Ultima chassis' similarity to other molded cars is obvious, but I wouldn't call it a rip-

off. Kyosho would have been foolish to try and reinvent the wheel just for the sake of being different.

• **Suspension.** Long, very rigid arms span from the bulkhead deep into the front wheels. An aluminum suspension pin is cleverly clipped into the bulkhead. The inner pins don't have slots for E-clips; they are trapped by the front bumper and nose plate. Rising-style shock mounts are bolted to the suspension arms and allow the shock angle to be changed without dramatically affecting ride height. On each end of the arms are composite steering knuckles and carriers. Several spacers of various thicknesses support the knuckle and can be adjusted up and down in the same way as the kingpin ball stud. The truck is also equipped with a full set of adjustable steel tie rods.

Composite plastic shock towers point skyward in the front and rear. Under the "hand-flex test," they rocked slightly front to back but didn't budge when the shock was forcefully compressed. A cool transponder mount is bolted to the rear tower and even has a little hole for the transponder clip, but it's brown.

The rear arms feel just as rigid as the front arms and also have a separate piece that's bolted on to serve as a lower shock-mounting plate. The rear hub carriers are kind of new; we've only seen these on Kyosho's TF4 touring car. They feature two holes for the upper camber link and three to adjust the hub height.

Two smooth aluminum double-cap dampers are on all four shock cartridges. These may be filled as though they were Losi or Associated units. The cartridges are easy to rebuild, and there are air bladders for the caps.

Right: the rear composite tower is very strong. A transponder mount is attached to it. This shows Kyosho is serious about racing.

Below: the front axle is threaded to accept a 3mm nut; the axle's diameter is $\frac{3}{16}$ inch, which will accept the American bearing used in the Pro-Line rim. Rim availability shouldn't be a problem because they are the same as Associated rims.



• **Transmission.** Bolted to the rear of the ST is a 3-gear transmission with bottom-mounted differential. The diff features readily available American-size diff balls and rings that you'll definitely appreciate when it's time to rebuild. Ball bearings support the diff's internals, and steel outdrives exit the tranny case. The diff design's only downfall is that it can't easily be adjusted without first removing the upper camber link and thrust-bearing-protection cap.

Airtronics® Super Exzes.

A couple of days before I planned to test the truck, I broke my arm in a snowboarding accident. Unable to use a wheel radio, I decided to try an Airtronics Super Exzes stick transmitter. Fortunately, I had had a lot of track time with sticks; I started my racing career with sticks and use them occasionally in my cars and all the time when I race boats. I chose the Exzes because it has all the features of the popular M8 radio, and with its movable gimbals, I can reposition the sticks to follow my thumbs' natural motion—perfect for my mangled arm's limitations!.

LRP® V6 speed controller.

LRP speedos make their way into many of my racecars, and one found its way into the Ultima. The V6 has a very smooth throttle response and is very efficient.

Trinity® 3000mAh matched battery pack.

Making run time with these batteries is never a problem, even when I gear a hot modified to the moon.

Kyosho® 11x2 motor.

Kyosho sent this motor with the test kit. The pearl white can looks cool, but the brown material used for the endbell kills me. But looks aren't everything; the motor is quick.

KO Propo® PDS 2123 FET digital servo.

Metal gears, digital FET technology and KO's legendary rep; it doesn't get much better than this. The servo moves so fast and with so much torque that I think the wheels might snap off.

TRACK TEST Kyosho Ultima ST Type R EP

Metric pitch gears are used internally as well as for the spur and pinion, but it is possible to swap the spur gear to an American 48-pitch gear. The tranny has a slipper clutch that protects the gears and smoothes the truck through the rough. Metal-shielded bearings support all of the tranny's moving parts, and universal axles transfer power to the wheels.

The motor is mounted on a flat metal plate, and the gears are protected by a Lexan cover with a plug that can be removed for slipper access. A plastic guard protects the motor from bumps and nose-high landings.

• **Wheels, tires and body.** Pro-Line, Pro-Line and Pro-Line. Kyosho enlisted help to make the truck look good as well as hook up right out of the box. A cool racing-style stadium truck body hugs the chassis and comes with a big decal sheet and paint masks, so you have no excuses for not making it look great. The wheels are very familiar—the same as Pro-Line offers for Associated vehicles. The rear axle is machined to fit the American Pro-Line rims as well as in front, where American standard bearings are used. The front rims are wrapped with Edge tires and the rears have Bow Ties.

PERFORMANCE

Building seemed to take forever—perhaps because I was very eager to try some laps with this new truck at our local track and hobby shop. The track is fairly smooth and has several mild roller jumps.

The Ultima rolled off the start on the straight, hooked up and laid down the forward traction. After running a few hot laps to get the feel of the truck, I really pushed it hard. But the Kyosho motor didn't have the snap I was looking for, so into the pits came the truck; I ejected the Kyosho motor in favor of an 11-turn Trinity D4 and installed a fresh pack of Trinity 3000s. Back on the track, I

wrung the truck out: at the end of the straight, I let off the throttle, and the truck exhibited a little push without any throttle or brake input. Through a series of S-turns, I found that the Ultima has an on-power push at around ½ throttle.

Jumping is very smooth: a quick on/off blip of the throttle, and the Ultima takes to the air with its nose about a hair above its rear. Let off the throttle while it's airborne, and the nose will drop slightly to get the front wheels to the ground and set up for the next turn.

Overall, I found the Ultima stable, even when dippin' through traffic. It just so happens that it comes with tires that have been proven to work well on my home track.

THE VERDICT

There has been a lot of talk about this truck in the pits—good and bad—with plenty of brand bias in the mix. I'm glad to see another competitor at the track; racing should be much more interesting now that the dominant two companies face a new challenger.

If you feel the same way and want to try something new, give the Ultima a try. If you need help setting it up, sponge a setup off an Associated driver; the two trucks have many similarities, so getting hooked up won't be a problem. Parts availability shouldn't be a problem either. Great Planes—Kyosho's distributor—has brought tons of parts over from Japan and bagged them individually, so you won't have to buy an entire parts tree just to get the specific part you need.

If you're in the market for a racing truck, take the Ultima for a test drive. If you already have a race truck, watch your rearview mirror.

*Addresses are listed alphabetically in "Featured Manufacturers" on page 208. ■

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Mod Clod Shoo

by Kevin Hetmanski

Now who's king of the hill?





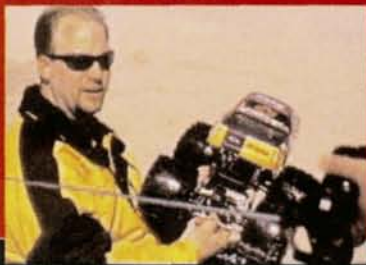
Shootout II



Two years ago, *Radio Control Car Action* featured a shootout between the ESP* and Bennett Equipment* chassis kits for the Tamiya* Clod Buster. Since then, other aftermarket companies have started to produce chassis and suspension kits for the almighty Tamiya Clod. It's time for another shootout! This time around, ESP and Bennett Equipment are joined by New Era*, Thunder Tech Racing*, and JPS Products* in a battle to see who's king of the Clods.

PHOTOS BY WALTER SIDAS

Mod Clod Shootout II



We ran the wheels off these trucks to see which was the best. But remember, all of the kits can be custom tailored to match your individual needs; our top pick might not be the best pick for you. Check out the ratings, look for the trucks that score well in the categories most important to you, and enjoy! All the mod Clods were a blast.

The Test Plan

Each truck was rated on a scale from 1 to 10 for the following:

Instructions

Each kit's instructions were rated for detail, clarity and completeness.

Ease of assembly

Here, we looked for good parts' fit and sensible component packaging. A high-scoring kit has parts that fit without hand-finishing or modification and interface precisely with the required Clod Buster parts.

Parts fit and finish

None of the chassis kits are cheap, so good finish work and appealing, sensible designs are expected.

Jumping ability

Whether you are racing or just playing around, how well your truck handles jumps is very important. High-scoring trucks launch level and settle quickly after landing.

Durability

If parts broke, loosened, or came out of adjustment, points were deducted.

Handling

For this element of the test, I set up a sweet monster truck course at R/C Madness. Using the type of track favored by the NR/CTPA as a guide, the trucks were run against a 4-minute clock to see which one could put down the most laps. I also tested the trucks' full-speed steering capability to see whether any of the machines pushed or oversteered.

Backyard bash

This was the hardest part of the testing (grin). I spent a day around the home-stand bombing around with the five trucks to see how they fared over grass, roots, logs, leaves and anything else a wooded backyard could dish out.

Different strokes for different folks ...

We tested all of the trucks with Associated shocks installed. I used the stock pistons, 25WT oil and Associated Black (soft) springs because, from my experience, I know this is a good starting point for the kinds of trucks tested here.

Some trucks may work better than others with this combination because of how their suspension is set up; for example, a truck with shocks mounted directly on the chassis may require stiffer springs than a truck that uses cantilevered shocks. Just as you do with off-road racecars, you can fine-tune these trucks' suspensions to suit the conditions you run in.

The Complete Clod

A common question among first-time mod Clod builders is "What do I need from my Clod kit, and what do I need to buy?" Here's everything you need to complete your chassis kit.

- 2 motors
- Battery
- 4 shocks
- Steering servo
- Servo-saver
- Radio
- 2 Clod Buster gearboxes
- Tires
- Rims
- Body mounts
- Body

To assure an accurate measure of each truck's capabilities, I fitted each with identical running gear. Here's a full list of the parts used:

Motors

Trinity* Speed Gems 2 Sapphire (17T)—part no. 9212 (2 per truck).

Shocks

Associated* shocks, 1.39 in. body with 1.32 in. shaft, hard-anodized, Teflon-sealed—7408 (2 pairs per truck).

Bearings

Bruckner Hobbies* Clod Buster bearing set—4002.

Speed control

LRP* F1 Pro reversing—8336.

Batteries

GM* VIS Team Pack 6Z—GM1221TT.

Tires

Pro-Line* Giant Trac tires—1056-00.

Servos

Hitec HS-605BB.



Bennett Equipment Clod-A-Leaver IIR

Features

- Stamped-aluminum chassis with square aluminum cross-members.
- 2-wheel steering.
- Cantilevered shocks.
- Front and rear swaybars.
- 4-link suspension.
- Small mounting plate for electronics.
- Servo mount.

Specs

Turning radius	116½ in.
Weight (RTR)	127 oz. (3,600g)
Suspension travel	1¾ in.
Ground clearance	2¾ in.
Wheelbase	13⅞ in.
Chassis material	Aluminum
Street price	\$235

Ratings

INSTRUCTIONS

The instructions for this kit need to be updated. The photos that show where everything goes aren't clear. Being able to see how the assembly is put together will eliminate your having to second-guess while you're building. **SCORE: 7**

EASE OF ASSEMBLY

Joining the chassis halves is a little tricky. The swaybar is mounted in the main part; it's somewhat difficult to snake it through the two mounting holes. The front gearbox has to be modified slightly in order to install the servo mount. **SCORE: 7**

PARTS FIT/FINISH

All of the parts fit together very well. There were no rough edges. **SCORE: 10**

JUMPING ABILITY

When coming off the ramp, the truck settled fast. The suspension does its job well. **SCORE: 9**

DURABILITY

One problem with the chassis involves the lower aluminum plate and 4-link mounting screws. When the truck takes a hard hit from the front, the screws have a tendency to bend the plate. This can be fixed by

adding another aluminum plate to strengthen the bottom of the chassis where the suspension is mounted. **SCORE: 7**

HANDLING

The car was very easy to control on the test track. I expected as much, considering that this chassis has won many NR/CTPA titles. **SCORE: 10**

BACKYARD BASH

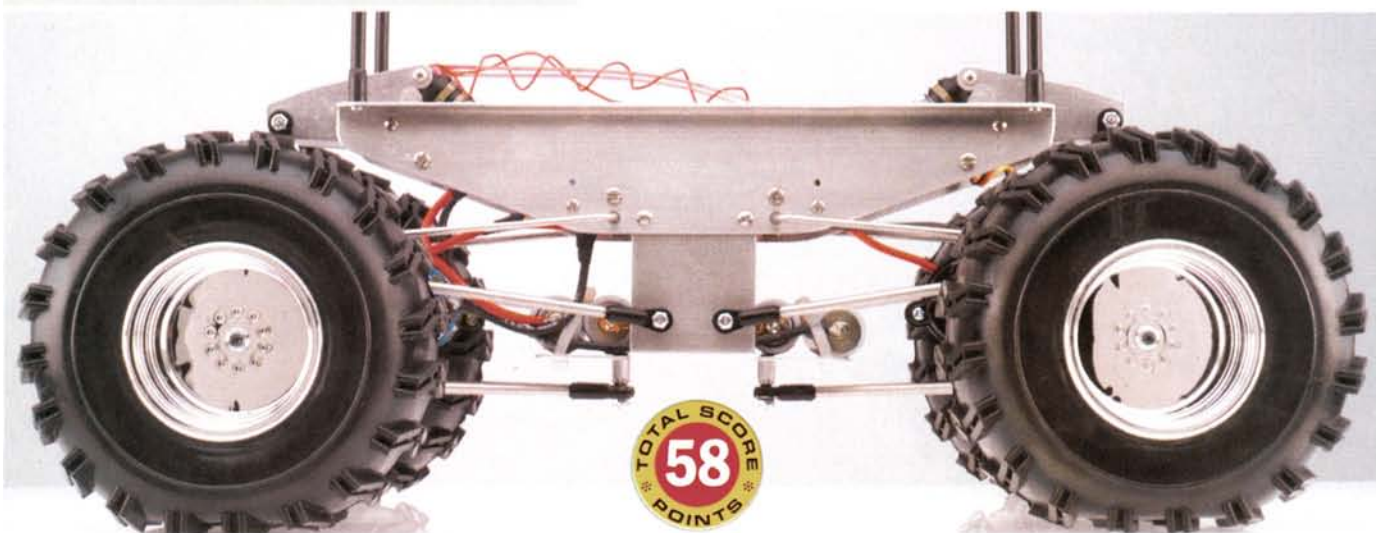
The bottom of the chassis sits close to the ground. It is hard to make the truck climb over obstacles without the chassis bottoming out. The ride height can be raised by lengthening the rods that connect the cantilevers to the gearboxes. Even with this slight problem, bombing around with this truck was fun. **SCORE: 8**

Likes

- Handles well.
- Batteries sit low to help keep the center of gravity (CG) down.

Dislikes

- Could look a little better.
- Screws for 4-link system can bend mounting plate.



The swaybars are U-shaped and run through both chassis plates. They are attached to the gearbox using the small nylon piece shown here. The swaybars can be stiffened by drilling holes in the chassis closer to the gearboxes and mounting them there.



The small radio plate is just big enough to mount your ESC and receiver on. It is situated low in the frame to help keep down the CG.



This servo mount places the servo directly on the front gearbox. Some trimming of the gearcase had to be done to make the mount fit.



The cantilevers are mounted on the inside of the chassis. This makes installing and removing the shocks a bit of a project. The sides of the frame can be mounted inside out so that you will have easier access to the shocks.

Mod Clod Shootout II



ESP Clodzilla IV

Features

- Chassis made of many types of aluminum stock.
- 4-wheel steering.
- Cantilevered shocks.
- Front and rear swaybars.
- 4-link suspension.
- Electronics mounted high in chassis on aluminum cross-plate.

Specs

Turning radius	103½ in.
Weight.....	129 oz. (3,642g)
Suspension travel.....	1⅞ in.
Ground clearance.....	4 in.
Wheelbase	13⅝ in.
Chassis material	Aluminum
Street price	\$259.99

Ratings

INSTRUCTIONS

The instructions include drawings to show you where all of the parts go. I can't say that I had any problem figuring out how to build this kit. **SCORE: 8**

EASE OF ASSEMBLY

The chassis is not the easiest thing to assemble. In many instances, screws must pass through several components at once. This requires you to hold all of the parts in position while you put the screws through the mounting holes and then try to attach the nuts—it soon becomes a juggling act. Other than that, everything went together easily. **SCORE: 7**

PARTS FIT/FINISH

All of the parts went together well; no modifications were necessary to make them fit right. All of the pieces have a clean, finished look. **SCORE: 10**

JUMPING ABILITY

The truck seemed stiff when landing. This can be fixed by changing shock springs and oil. **SCORE: 7**

DURABILITY

I can't say that there was any problem in this department. The ESP held up well. **SCORE: 9**

HANDLING

This truck is a bit of a handful on the track. It can be tamed by adding ESP's® aftermarket servo-saver and setting up the steering just right. You can also lower the truck by removing the 1-inch aluminum, cantilever link and replacing it with the two rod ends screwed to the threaded stud that is now screwed to that link. **SCORE: 7**

BACKYARD BASH

I had a blast driving this truck around the yard. The suspension was dialed for climbing over obstacles thanks to its high ground clearance. Four-wheel steering was great in tight places. **SCORE: 10**

Likes

- Great finish.
- Tons of suspension travel.
- Fun to bash around with.

Dislikes

- Does not include optional heavy-duty ESP servo-savers to replace the weak stock units.
- Chassis assembly is a little rough.



The cantilevers on the ESP truck pivot on ball bearings. The truck can be lowered by removing the 1-inch-long link and replacing it with the threaded stud that is screwed into the link; the rod ends are screwed onto the stud until they touch.

The cantilevers are attached to the gearbox with these small pieces of aluminum stock. The swaybar is attached to the gearbox using rod ends. Notice the stock servo-saver; it is completely locked out. Kimbrough® servo-savers now take over that job.

This is the busy end of the truck. The swaybars pivot on small rubber grommets. The screws that attach the 4-link suspension to the chassis have a dual purpose.

The servos are mounted on the gearbox using this L-shaped piece of aluminum. The servos are attached with double-sided tape. Zip-ties will give you extra security and keep the servo securely fastened.



JPS Products Pro Chassis

Features

- Chassis is machined from a solid piece of aircraft-grade aluminum.
- 2-wheel steering.
- Several mounting positions for the shocks and suspension arms.
- Cantilevered shocks
- 4-link suspension.
- Front and rear swaybars.

Specs

Turning radius	110 in.
Weight.....	128 oz. (3,624g)
Suspension travel.....	3½ in.
Ground clearance.....	4¾ in.
Wheelbase	13¼ in.
Chassis material	Aluminum
Street price	\$249

Ratings

INSTRUCTIONS

These instructions are the best of the bunch. There are photos of the parts installed on the truck. There are arrows showing you where everything goes, and there are even specifications for the lengths of screws and links. **SCORE: 10**

EASE OF ASSEMBLY

The main chassis comes fully assembled. You need only attach the 4-link suspension, shocks, servo-mount/bumper and body mounts. This assembly is quick and easy to do. **SCORE: 10**

PARTS FIT/FINISH

There was no need for any modification to get the parts to fit right. Initially, the chassis looked great, but a closer look revealed marks left by the manufacturing process. These might prove to be too much of an eyesore for some people. **SCORE: 9**

JUMPING ABILITY

The suspension on this truck works very well; it soaks up the landing and settles down quickly and keeps asking for more. **SCORE: 9**

DURABILITY

I figured it would be hard to bend or break anything on a chassis that had been

machined out of solid aluminum billet, and I was right. This truck held up well after everything I put it through. **SCORE: 10**

HANDLING

The JPS monster cruised through the course without any problems whatsoever. Through all of the turns, the stiff swaybar kept the truck's tires on the ground where they belong.

SCORE: 10

BACKYARD BASH

This truck was a pleasure to drive around the yard. The only real problem I encountered was that the stiffness of the swaybar hurt the truck a little when it climbed obstacles. The truck had a little 3-wheel action going and that caused one of the diffs to unload.

SCORE: 8

Likes

- Machined chassis is a work of art.
- Lightweight and rugged.
- User-friendly instructions and a completed chassis make assembly fast and easy.

Dislikes

- Swaybar is a little too stiff.



The servo mount also acts as a bumper. Try bending this one! You are guaranteed not to have any flexing here.

The cantilever link is attached to the upper brace with a small piece of machined aluminum. Check out the swaybar; it is a steel rod attached to a thick aluminum rod. The aluminum rod pivots in two aluminum brackets.

JPS has gone all out on the chassis and cantilevers; they're very good-looking. Many mounting positions are available for the shocks and the link. The cantilevers also pivot on ball bearings.

There is only one word for this chassis: beefy! This bottom plate can take a severe beating. The screws for the 4-link suspension are threaded into 4-40 tapped holes, making assembly fast and easy.

Mod Clod Shootout II



New Era Monster Clod

Features

- Chassis is constructed of 4130 chromoly tubular steel.
- 2-wheel steering.
- Rear steering lockout.
- 4-link suspension.
- Rear swaybar.

Specs

Turning radius	93 ³ / ₄ in.
Weight.....	152oz. (4,323g)
Suspension travel.....	1 ⁵ / ₈ in.
Ground clearance.....	3 ¹ / ₂ in.
Wheelbase	11 ¹ / ₂ in.
Chassis material	4130 chromoly tubular steel
Street price	\$209.95

Ratings

INSTRUCTIONS

Photos of the parts installed on the truck show you how they are supposed to fit together. The wording as to which screws go where is not always clear. Some of the photos do not show you everything you need to see. **SCORE: 8**

EASE OF ASSEMBLY

Attaching everything to the chassis was easy. You must, however, drill holes in the rear steering rod for the rear steering lockout, fabricate some sort of battery mount, find a way to mount the speedo and receiver and figure out how to mount the body. Too much of this stuff is left up to the builder; this can be frustrating and time-consuming for the average hobbyist. **SCORE: 5**

PARTS FIT/FINISH

All of the parts fit together well. The welds on the chassis are not the world's cleanest-looking, but they do the job. The powder coating looks great. **SCORE: 8**

JUMPING ABILITY

The New Era truck seemed a bit stiff when landing. It took a while for this beast to settle down; the combination of stiffness and a short wheelbase made the truck flip over. **SCORE: 7**

DURABILITY

I think you can guess what happened during our durability check. Nothing! You can literally stand on this chassis without harming it—a definite sign of durability. **SCORE: 10**

HANDLING

This truck was a bit of a handful on the R/C Madness (Enfield, CT) track. In the middle of taking a tight turn at high speed, the truck flipped over, due to the high placement of the heavy roll cage and short wheelbase. It was also a bit bouncy off the jumps. **SCORE: 7**

BACKYARD BASH

As with the Thunder Tech truck, the New Era pulled wheelies whenever you mashed the throttle. Driving over rocks and obstacles with the truck is fun but, if you aren't careful, you can easily flip it. **SCORE: 8**

Likes

- Indestructible chassis.
- Realistic monster truck look.

Dislikes

- You have to make your own mounting plate for the ESC and receiver.
- Does not offer any means for mounting the battery or body (body mount is optional).
- Flips over easily.



Details, top to bottom: this mounting bracket is attached to the upper support brace with a large pan-head screw. On the other side, the bracket has a small notch cut out that is keyed into the upper brace. This is used to mount the shocks and the rear swaybar.

This truck comes with a solid servo mount. To mount the larger Hitec servo on this bracket, I had to drill two new holes a little lower than the stock ones. Unlike in other trucks, the upper links are attached at the top and in the center of the gearbox.

The swaybar is made of two pieces of square aluminum stock; they are attached to a large-diameter piece of steel rod. The steel rod pivots on a small piece of nylon at each side of the frame.

Mod Clod Shootout II



Thunder Tech Racing Centurion

Features

- Carbon-fiber chassis.
- 2-wheel steering.
- Rear steering lockout.
- Cantilevered shocks.
- 4-link suspension.
- Front and rear swaybars.
- Body mounts.
- Body.
- Battery cups.
- Mounting plates for electronics in the front and rear of the chassis.

Specs

Turning radius	66½ in.
Weight.....	130 oz. (3,686g)
Suspension travel.....	1½ in.
Ground clearance.....	3 in.
Wheelbase	11¼ in.
Chassis material	Carbon fiber
Street price	\$449.95

Ratings

INSTRUCTIONS

The kit that I received for the shootout was a preproduction truck and the instructions were a little rough. Thunder Tech is working on the instructions and will have detailed CAD drawings and building instructions in production kits. Based on the artwork I saw, the finished materials should be very good. **SCORE: 7**

EASE OF ASSEMBLY

This chassis features 14 cross-members. Each one has to be screwed to both chassis halves. The rest of the assembly is not as tedious. If you have big hands like me, you may have trouble installing the electronics. The opening for the servo in the servo mount was not big enough to fit the Hitec* servo; some grinding was necessary to make it fit. **SCORE: 8**

PARTS FIT/FINISH

The parts went together without their needing any modifications. The materials are well finished. The chassis halves have that clean, pan-car look. **SCORE: 9**

JUMPING ABILITY:

The suspension soaks the jumps up well. The short wheelbase can make jumping a little hairy, but the truck can be stabilized by adding the optional long-wheelbase suspension kit. **SCORE: 8**

DURABILITY

The chassis and roll cage held up very well during our tests. I did have a problem with the 4-link suspension. On taking a hard hit, the threaded stud was ripped out of one of the graphite links. **SCORE: 8**

HANDLING

This truck soaked up the small bumps and jumps at the track. Turning, on the other hand, was a bit scary. The short wheelbase and high CG caused the truck to flip over easily. The kit's light swaybar caused the front inside wheel to lift off the ground, and that made the truck spin out. **SCORE: 7**

BACKYARD BASH

I had a lot of fun driving this truck. It can pull wheelies all day long. The loose swaybar and decent ground clearance allow it to climb rocks well, but it did flip over a lot because of its short wheelbase. **SCORE: 9**

Likes

- Sweet-looking carbon-fiber chassis.
- Simple, effective servo mount.
- Body and body mounts are included.

Dislikes

- Battery mounted high in the frame, creating a high CG.
- Electronics are hard to mount.
- Swaybar is too light.
- Flips over easily.



Details left to right: the screws that are used to attach the bottom bars of the 4-link to the chassis are captured at both ends to prevent them from bending or breaking.

The cantilevers pivot on ball bearings. Notice the placement of the swaybar. Thunder Tech offers several mounting positions for the cantilever link to alter how the cantilever works.

Reaching the battery is a snap. The batteries are held in place by Associated battery cups. The batteries are mounted high in the frame, creating a high CG. There is room to mount the batteries lower in the frame.

Traxxas body mounts and a body are included with this kit. These body mounts eliminate the guesswork when mounting the body.



TOTAL SCORE
56
POINTS

*Addresses are listed alphabetically in "Featured Manufacturers" on page 208. ■

REAL PERFORMANCE UPGRADES

These parts will make a genuine difference in your car's performance by making it more easily adjustable, more durable, or lighter. None of these parts will guarantee victory (or keep you out of the winners' circle if you don't have 'em), but they are all wise additions to your race rig. The "Must Have Factor" ranges from 1 to 10: the higher the number, the more crucial the item is to average club racers.

THREADED SHOCK BODIES

Convenient, precise spring-preload adjustments are what you can expect when you switch to threaded shock bodies. These bodies won't improve performance, but they sure make it easy to dial in your suspension for a tweak-free ride.

MUST-HAVE FACTOR: 5
COST: \$30/PAIR

These bodies are optional parts from Losi, with Trinity's knurled, preload collars.



TITANIUM TIE RODS

The steel tie rods included with most race kits are perfectly adequate—as long as you don't crash. Unfortunately, you will crash, and sooner or later, one of those steel tie rods is going to bend or break. Titanium units won't make your car feel any different, but they are far stronger—and lighter, to boot.

MUST-HAVE FACTOR: 9
COST: \$40 TO \$50/SET

Lunsford offers a full line of "natural" titanium tie rods; blue titanium tie rods are available from Associated's Factory Team line.



UNIVERSALS

Simply put, dogbones are for dogs. Real race machines use universal-joint axles to get power from the tranny to the wheels. Universals offer less backlash and chatter, and that makes for smoother power delivery and more power on the ground.

MUST-HAVE FACTOR: 9
COST: \$30 TO \$40/PAIR

MIP's CVD design is the industry leader. Super smooth and rebuildable, CVDs are the axles to get.



TRANSMISSION AND HINGE-PIN BRACES

An off-road vehicle's suspension is pounded nonstop during each run, so anything you can bolt on to increase rigidity and strength will help your vehicle perform its best. An aluminum hinge-pin brace is stronger than a stock plastic or fiberglass brace (or no brace at all), and a brace that joins the transmission and shock tower will help your suspension do its job more effectively.

MUST-HAVE FACTOR: 5
COST: \$7 TO \$15 EACH

Team Kinwald braces from Trinity are available for the Losi Double-X (right) and Triple-X (left), as well as other vehicles.



WHEN WAS THE LAST TIME you saw custom-anodized accessories for stamp collecting? Got any graphite stuff for your Pokemon cards? Ever emailed pictures of your PlayStation to show off your personal touches? Didn't think so. That brings us to Reason Why RC Rules number 1,097,456: hop-up parts. This month, we take a look at 25 bolt-on items that will enhance the looks and performance of your off-road machine.

by the staff of RC CAR ACTION

BEST OFF-ROAD UP

MUST-HAVE MODS

Team Losi Titanium Nitride shock shafts (shown) and Associated Factory Team "Unobtanium" shafts are offered for all Associated and Losi off-road vehicles.

TITANIUM NITRIDE SHOCK SHAFTS

You might think there isn't much wear and tear on shock shafts; after all, how much damage can a pair of lubricated rubber O-rings do to steel? Over time, though, dirt and grit will scuff and possibly scratch your shock shafts, and this can lead to leaks and possible O-ring failure. To extend wear and ensure smooth shock action, titanium nitride shock shafts feature a hard coating of the stuff they're named for. Your car or truck won't feel any different, but you'll get more time between rebuilds and longer-lasting smoothness from your shocks.

MUST-HAVE FACTOR: 5
COST: \$15/PAIR

ALUMINUM PIVOT BALLS

Every gram counts—especially if you're a stock racer. Team Losi's lightweight aluminum pivot ball will save a few precious grams over the standard steel pieces.

MUST-HAVE FACTOR: 3
COST: \$5/PAIR

If you're running a Losi car or truck, replace the stock, steel bowling balls with lightweight aluminum pieces.

This KO servo has enough steering muscle for any off-road machine, including 1/8 scale.

HIGH-PERFORMANCE STEERING SERVO

A high-performance steering servo and a \$14 "standard" servo look exactly the same; it's no wonder that most hobbyists would rather spend their hop-up money on something that looks cool. But if your idea of "looking cool" involves crossing the finish line first, you should definitely invest in a high-torque/high-speed servo—especially if you're running a truck. In addition to steering your machine with authority, a race-quality servo will center better, so your car will actually track straight without constant correction.

MUST-HAVE FACTOR: 9
COST: \$50 TO \$100

RPM GEAR COVER

Factory gear covers work OK, but for optimum spur and pinion protection, RPM's molded gear covers are the hot setup. Their precision-molded construction allows them to better seal against the motor plate, and the soft rubber plugs that cover the slipper access holes are easier to remove for adjustments, yet stay put on the track. RPM gear covers come in neon blue, neon yellow and black to fit all Losi and Associated machines.

MUST-HAVE FACTOR: 8
COST: \$7

RPM offers gear covers to fit just about everything off-road. Don't let a pebble bump you out of the A!

RPM BALL CUPS

After a few hard weekends of racing, you'll notice more play in the steering system and suspension parts than there was when the kit was new. The extra slop comes from worn, stretched ball cups. You could just as easily outfit your car with fresh OEM ball cups to tighten up the linkages, but RPM's pieces are extra tough—and they come in colors!

MUST-HAVE FACTOR: 5
COST: \$8/SET OF 12

Once you've installed RPM ball cups, you won't think twice about them—unless you think, "Gee, I haven't popped a ball cup in a long time."

THE BASICS

Want to take your car or truck from "entry level" to the next level? These are the items to get first. Consider them all to be 10s on the Must-Have-o-Meter.

ESC

That's the acronym for "electronic speed control," a solid-state throttle that replaces the mechanical "three-step" or wiper-arm throttle found in most entry-level kits. An ESC will also replace the servo required to operate the mechanical speed control, the resistor and maybe an ugly bracket or two. That lightens up your car for better performance, and an ESC simply works better; you'll experience butter-smooth, instantaneous throttle action without "dead spots," longer run times and greater durability. For play, get yourself a reversing unit; for race action, get a "forward-only" ESC for maximum performance.

COST: \$30 TO \$100

This DuraTrax Streak will outperform any mechanical speed control, and its high-frequency operation makes it a good racing controller.



GRADES

Trinity leads the rebuildable stock-motor segment with the Paradox and P2K. For even more power, try a machine-wound modified such as an Orion Pilot, Reedy Pulse R, or Trinity Speed Gem.



REBUILDABLE MOTOR

The 540 motor included with most electric kits is way too anemic for real off-road performance. A competition stock motor will give your car better performance without reducing your run times below the fun level. Get a rebuildable mill so you can maintain the motor as parts wear instead of junking the whole magilla when performance suffers.

COST: \$30 TO \$40

Most manufacturers offer a slipper clutch for their off-road cars; check your manual for a part number. This is MRC's unit, mounted on an Ironman.

SLIPPER CLUTCH

In addition to helping get power to the ground without spinning the tires all the way down the front straight, a slipper clutch protects your car's transmission gears from sudden jolts when you land jumps with the power on or slam the car into reverse while moving forward. A properly set slipper clutch will help your transmission last longer and will make your car easier to control.

COST: \$20 TO \$30



If your kit's manufacturer doesn't offer a bearing set for your car, assemble one yourself with bearings from DuraTrax, Acer Racing, or Boca Bearing.

BALL BEARINGS

If your car's rotating parts are spinning on metal or plastic bushings, its motor or engine is working harder than it has to, and your car or truck isn't accelerating or going as fast as it can. If you can afford to buy a set of bearings with your kit, go for it; it's easier to install the bearings as you build rather than to tear down the car later. But even if you do have to dismantle your car to install them, get bearings; you will feel a difference.

COST: \$30 TO \$50/SET

ALUMINUM SHOCKS

There's absolutely nothing wrong with plastic shocks, but for the most consistent damping, longest wear and greatest durability, aluminum is the way to go. The shock caps won't peel off in a crash, and the aluminum bodies stay smooth longer than plastic pieces.

COST: \$15 TO \$35/PAIR

Traxxas's Big Bore shocks are a natural for Traxxas vehicles, but they're also a good match for many other off-road kits. They're offered in three lengths to suit just about any 1/10 machine.

LOW-LOSS CONNECTORS

JST or "Tamiya-style" connectors are the industry standard for batteries and ESCs, but they aren't the hot setup for maximum power or efficiency. JST connectors have been known to melt together when used in high-performance applications—that's energy that isn't making it to your motor.

COST: \$10 TO \$20 FOR 10

"Red and black" connectors from DuraTrax and Acer Racing are far more efficient than Tamiya-type plugs. Deans' familiar orange connectors are another favorite among racers.



TUNER'S TOOLBOX

Ready to start racing? These items will let you match your machine to the track conditions of the day. All peg the needle on the Must Have meter.

TIRES

If you want to go as fast as possible in the dirt, you must have the right tires. How do you find the right tires? Ask around at the track; usually, no more than three types of tires work well. One set usually works best when the track is damp and/or cold, and another hooks up when the track dries out and/or warms up.

COST: \$17/PAIR

Pro-Line and Team Losi rule the off-road tire world; ask around at your local track to see what the hot setup is.



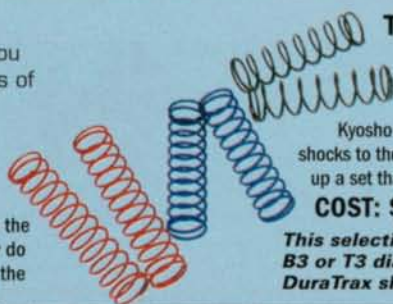
TUNING SPRINGS

Once you've sorted out which tires to run, it's time to tweak the suspension. There are two biggies in this department: springs and shock fluid. Losi, Associated, Schumacher, Yokomo and

Kyosho all offer springs in various rates (degrees of stiffness) to tune your shocks to the track. If you can't buy the entire range in one shot, at least pick up a set that's one level stiffer and one level softer than stock.

COST: \$8/PAIR

This selection of springs from Team Associated will keep a B3 or T3 dialed in on any track. The springs also fit HPI and DuraTrax shocks.



SHOCK FLUID

The viscosity of the fluid within your car's shocks combined with the size of the holes or slots in the shock piston control your shocks' damping force. A range of fluid viscosities will allow you to match the shock's damping force to those tuning springs you just bought (stiffer springs require more damping, and vice versa).

COST: \$25/10-BOTTLE SET

Team Losi has the best shock fluid—there, I said it. The Certified line is the most consistent, highest-quality stuff in RC. Save money and buy the multi-pack.



JUST FOR LOOKS

From a rational, performance-first standpoint, these goodies offer zero Must Have factor; but when it comes to an emotional response, these parts are a perfect 10.



General Silicones has a huge line of anodized fasteners in 7075 aluminum. **Trinity, Associated** and others also offer the colored stuff.

ANODIZED HARDWARE

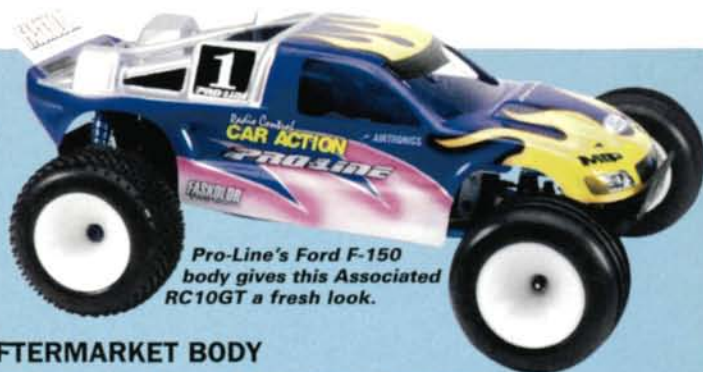
Have fun with colored screws, but remember: those screws are aluminum. That means they aren't as strong as steel or titanium, so avoid using them in high-load applications (shock mounts and bulkheads, most notably).

COST: \$10 TO \$20/SET

ALUMINUM PACK BRACE

Sure, it might be a gram or two lighter than stock and add negligible pack cooling, but mostly, it looks cool.

COST: \$20



Pro-Line's Ford F-150 body gives this Associated RC10GT a fresh look.

AFTERMARKET BODY

Tired of having a truck or buggy that looks exactly like everyone else's? Go aftermarket. In addition to a different look, you'll usually get more decals and window masks to make finishing easier.

COST: \$15 TO \$20



Trinity offers this brace for Team Losi machines, as well as the Associated B3 and T3.

STRICTLY NITRO

HEAT-SINK HEAD

Cast heads are becoming scarce, but there are still some nitro kits out there with these under-efficient, nasty-looking fin piles. Get yourself a tall, machined-aluminum unit to cool your powerplant efficiently so you can safely run a leaner carb setting. Added bonus: in most cases, you can match the color of the head to your chassis. HPI's purple head for the Nitro Star 12 is pictured.

MUST-HAVE FACTOR: 10
COST: \$30 TO \$50



TUNED PIPE

The cheesy model-airplane-style mufflers that sprout off the side of many entry-level nitro kits do a good job of quieting your car's engine, and they do an even better job of robbing its power and heating it up. Grab your manual and order the factory tuned pipe and manifold for higher maximum rpm, greater fuel efficiency, more power, and a snarling exhaust note. This one's a Paris Turbo Ring.

MUST-HAVE FACTOR: 10
COST: \$30 TO \$50



Du-Bro's in-line fuel filter is well worth the 8 seconds it will take to install it.

FUEL FILTER

It only takes a single grain of sand to score a piston and sleeve, or even stop your engine dead in its tracks. Don't rely on a factory in-tank filter; get an in-line unit so you can sleep at night.

MUST-HAVE FACTOR: 10
COST: \$5 TO \$15



LOSE THE PULL-STARTER!

This is more of a mod than a hop-up. Remove the pull-starter from your engine and replace it with a back-plate (you'll also have to grind the starting nub off the crankshaft, or replace it entirely). What's the benefit? Increased rpm and quicker throttle response, thanks to reduced mass and bearing drag. Bummer alert: you now have to buy a starter box.

MUST-HAVE FACTOR: 7
COST: \$10 TO \$20

In addition to the performance benefits, your car will have a cleaner look with the engine's pull-starter removed.

Addresses are listed alphabetically in "Featured Manufacturers" on page 208. ■

TEAM LOSI RALLY WEAPON GETS GREEN LIGHT

You've seen this pic before—it's Richard Trujillo's custom "Rally Weapon." The last time we ran the shot, we asked you to call or email Team Losi with your comments about it. And respond you did! Thanks to your overwhelming support of the project, Team Losi has decided to release a complete kit that will feature many of Richard's innovations, such as medium-length shocks that give the car "buggy-like" suspension travel. There are currently plans to release the kit with a Ford Focus body (we're not sure if it will be a licensed design or just "Focus"-style), new Team Losi rally rubber and even rally wheels. Special rear hub carriers will also be included to shift the Street Weapon platform into rally mode.



With Losi joining the rally game, we have to wonder if more local rally classes will start popping up; with HPI, Schumacher, Tamiya, OFNA and Yokomo all fielding multipurpose machines, there's a lot of potential for a fun, diverse class. If your local track runs a class, let us know what the rules are and which type of track you're running on. Include a few pics if you can! Send your stuff to George Gonzalez, c/o Radio Control Car Action, 100 East Ridge, Ridgefield CT 06877, or email george@airage.com.

JIMMY JACOBSON JOINS TAMIYA

Team Orion factory driver Jimmy Jacobson, well-known for his off-road antics, has joined Team Tamiya and will race the company's soon-to-be-released TA04 dual-belt touring car in national and world championship competitions. Jacobson finished second in 4WD at the '99 IFMAR Off-Road Worlds and was an A-main finalist at many of the large touring-car races last year, so we expect this new racing partnership to be successful. Jacobson's cars will be powered by Team Orion motors and batteries and will sport the Team's purple and silver livery.



Team Losi releases BK Bar buggy tire

Team Losi debuted this new tread design at the Winterchamps. Although not the tire of choice for that weekend of racing, the BK Bar is reported to work well on hard-packed, blue-groove surfaces that typically require slicks. The tread design is patterned after the highly unorthodox "inside out" tires that Brian Kinwald hand-built for the last IFMAR Worlds—hence, the "BK" in the name. The tires will be offered in Losi's red, silver and new pink compounds, and they should be available by the time you read this.



WINTERCHAMPS WINNERS

Team Losi dominated the 2000 Florida Winterchamps podium by taking the Truck Modified and 4WD Modified victories (courtesy of Matt Francis and Jukka Steenari, respectively), while Team Associated's Billy Easton took home the 2WD Modified victory. Here are the mod results; look for a full race report in the next issue, including the stock classes.

2WD MODIFIED

FINISHED	QUALIFIED	DRIVER	VEHICLE
1	5	Billy Easton	Associated
2	2	Mark Pavidis	Associated
3	3	Brian Kinwald	Losi
4	8	Lloyd Dussoneville	Associated
5	10	Scott Brown	Losi
6	7	Jason Hanna	Losi
7	6	Dave Montgomery	Losi
8	4	Rick Holwart	Losi
9	9	JR Mitch	Schumacher
10	1	Matt Francis	Losi

4WD MODIFIED

FINISHED	QUALIFIED	DRIVER	VEHICLE
1	1	Jukka Steenari	Losi
2	3	Brian Kinwald	Losi
3	4	Todd Hodge	Losi
4	2	Jimmy Jacobson	Losi
5	9	Rick Holwart	Losi
6	6	Brian Duerber	Losi
7	8	Marcus Lubke	Schumacher
8	10	Travis Amerman	Losi
9	5	Matt Francis	Losi
10	7	Chris Bing	Losi

TRUCK MODIFIED

FINISHED	QUALIFIED	DRIVER	VEHICLE
1	1	Matt Francis	Losi
2	3	Brian Kinwald	Losi
3	9	Billy Easton	Associated
4	6	Jimmy Jacobson	Associated
5	2	Scott Hughes	Associated
6	5	Adam Drake	Losi
7	10	Greg Hodapp	Associated
8	7	Jason Hanna	Losi
9	8	Mark Francis	Losi
10	4	Rick Holwart	Losi



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SPEED SHOP

Boca Ceramic Bearings

According to Boca Bearing*, installing the company's new ceramic bearings will result in a measurable increase in performance because of their lower weight and ability to withstand higher operating temperatures and endure greater loads. In addition, the ceramic bearings reportedly require less lubrication, are corrosion-resistant and almost impervious to wear.

Unfortunately, this technology is a bit pricey, so most racers will probably use the bearings where their claimed advantages can be most effective. Boca suggests that nitro racers replace their crankshaft and clutch-bell bearings with ceramic units; a full line of ceramic bearings to fit most .12 through .21 engines is available, as is a full line of ceramic bearings to fit your engine's clutch bell. If you Rockefellers out there want to equip your entire car, other sizes are offered to outfit just about any application. The ENK-05C front and rear ceramic engine bearings (sold in pairs) and the MR105C-2 and FR156C-2 ceramic clutch-bell bearings (each size sold individually, or in packs of two) are shown here. Call Boca Bearing for a catalog, or log on to its website, www.bocabearings.com, for a complete parts and price list.

Ceramic crankshaft bearings—part no. ENK-05C, \$70.95.

Ceramic clutch-bell bearings (F/R)—FR156C-2/MR105C-2, \$17.95.



CEN Flexible Header

Here's a product that I found particularly interesting: CEN's* new flexible manifold for .12 and .15 side-exhaust engines. This new exhaust header can easily be bent to go around pull-start mechanisms and other components, and it helps provide extra clearance in "tight fit" applications. Because it can be bent in any direction, the flexible header is perfect for custom installations. The manifold has a large inner diameter to provide maximum airflow and features a metallic, powder-coated finish that looks trick. A manifold gasket and two mounting screws of different sizes are also included with the manifold. **CEN flexible manifold—G70333, \$28.99.**

GS Racing 7075 Aluminum hardware

Anodized-aluminum hardware is nothing new, but GS Racing* offers a new twist; instead of using softer alloys, the GS screws are machined from harder, tougher 7075 alloy. That means you can use the screws in more applications. GS offers the usual machine threads and also has self-tapping screws that are perfect for HPI and Tamiya kits. A variety of conical washers and linkage spacers are also available (as unstressed parts, these are not made of 7075 aluminum). Did you notice the antenna mount? It uses a collet to grip the antenna, and it looks great, too. GS Racing offers the hardware, mounts and other aluminum parts in purple, blue and red. There are too many part numbers to list here; contact GS Racing for information.

Antenna mount—GS-A00410 (state color), \$5.99.

M3x8/12/15mm flat-head hex self-tapping screws (10)—\$4.49.

M3x8/10/12/15/18mm flat-head hex machine screws (10)—\$4.49 to \$5.49.

3mm countersunk washers (20)—\$6.49.

4mm countersunk washers (10)—\$3.99.

3mm linkage spacers (10)—\$4.49.



HPI Pro Molded Inner Foams

New, softer, 24mm HPI* Pro molded inner foams for all medium-narrow tires and wheels are now available. The insets are color-coded for easy identification, and they work with any medium-narrow tire-and-wheel combination.

Pro molded inner foam, 24mm—4629

(Yellow/Soft), 4630 (Red/Medium Soft), 4631 (Green/Medium), 4632 (Blue/Medium Firm); \$5/pair.

New, Preassembled 24mm Sedan Meats from Pro-Line

Pro-Line* has expanded its popular preassembled wheel/tire line to include new, 24mm-wide mounted and trued foam tires and new, 24mm preassembled capped tires. The 24mm foam and capped tires are mounted on white Pro-Line Axis wheels and are expertly assembled at the Pro-Line/Jaco factory. The foam tires are offered in standard Green and Blue compounds as well as Jaco's exotic Pink, Purple, White and Red low-wear compounds. The 24mm preassembled capped tires are available in Pro-Line's soft Yellow and medium Green compounds, and both provide excellent grip and low wear—perfect for nitro touring racing.

Pro-Line 24mm mounted and trued foam tires—2162 Blue (standard firm), 2163 Green (standard medium), 2164 Pink (medium-soft), 2165 Purple (medium-firm), 2166 White (medium), 2167 Red (firm); \$14.95 to \$20.95.

Pro-Line 24mm preassembled capped touring-car tires—2994 Yellow (soft), 2995 Green (medium); \$34.50.



SPEED SHOP

Factory Team B3

Masami Hirotsuka's win at the '99 IFMAR Worlds in Finland gave Team Associated* its 16th world championship. This victory also marked the sixth world championship won by an RC10 off-road buggy. To commemorate this unequalled track record, Team Associated has just released the RC10B3 Factory Team Edition, which is basically a fully loaded factory ride.

The Factory B3 includes sealed ball bearings, graphite chassis, suspension arms and shock towers, blue-anodized motor plate, chassis plate and front kick-up, blue titanium turnbuckles, hard-anodized, Teflon-coated shocks and MIP CVDs. The buggy also includes Pro-Line's new low-profile Deja Vu Tu body, wide wheels and racing-compound tires. The Factory Team Edition B3 includes more than \$100 in upgrades and costs about \$70 more than the B3 Team Kit, which makes it a bargain.

The B3 Team kit has also been updated and now includes sealed bearings, hard-anodized, Teflon-coated shocks, Pro-Line one-piece wheels and racing-compound tires. The Team Kit will also include a new, low-profile, rear shock tower that accommodates the included Pro-Line Deja Vu Tu body as well.

Factory Team B3—part no. 9043, \$369.95.
RC10B3 Team Kit—9032, \$299.95.



Robinson Racing Products' Lightweight Flywheel for HPI Nitro RS4 Series and Hardened Steel Clutch-Bell/Spur-Gear Combo for RC10GT



Robinson's* new flywheel fits all HPI Nitro RS4 kits and features a unique lightening-hole pattern that actually "fans" the engine. It isn't like having air conditioning or anything, but it can't hurt! The 6061 flywheel is a direct fit, weighs the same as HPI's lightened flywheel and accepts standard, two-shoe clutch parts.

For you off-road nitro guys who run Associated RC10GTs, Robinson's steel, 15T, clutch-bell/65T spur-gear combos will just about guarantee that you'll never strip another gear. The parts are machined from solid steel then hardened for over-the-top durability. The clutch bell fits all Associated and MIP shoes.

Lightweight flywheel for Nitro RS4—1570, \$24.50.
RC10GT steel gear combo—RRP 2365, \$36.50.



HPI 200mm Celica Shell

HPI's latest body will give your nitro tourer Toyota's home-run Celica look. The body kit includes a giant, flexible, vinyl decal sheet that includes window trim, headlights, grills, taillights, HPI logos and other details. The silver "slash" graphics are included as well for an easy custom look. Window masks and overspray film are also included, so finishing the shell is a snap, and the rear wing is supplied for maximum downforce and best handling. The Celica body is also offered with the Nitro RS4 2 kit.

Toyota Celica body—7470, \$24.
Nitro RS4 2 kit with Toyota Celica body—416, \$439.



5 QUESTIONS

Age: 30

Last big win: 1999

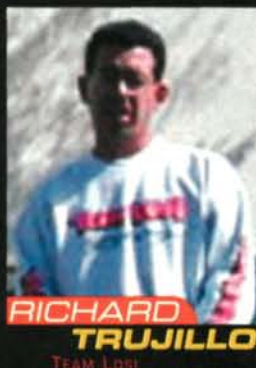
Reedy Touring Race of
Champions (Stock)

Home track: none

First RC car:

Tamiya Subaru Brat with
"trick" Frog oil shocks

Sponsors: Team Losi,
Peak Performance and
Novak Electronics



RICHARD TRUJILLO
TEAM LOSI

RC Car Action: Welcome back from the Winterchamps, and congratulations on the wins. What was it like managing the Team Losi racing team? With so many sponsored drivers, your job must be very challenging.

Richard Trujillo: Thanks; the guys did a great job. As far as managing the team goes, it's actually not that bad. I get a lot of help from Randy Poh, and Todd Hodge has been a huge help getting ready for races. All things considered, we actually have a small team—about 55 racers worldwide.

RCCA: What's the toughest part of your job? Which aspects of it do you enjoy the most?

RT: Probably the toughest part of the job is trying to make sure I bring everything we might need. Of course, I never do. Seems as though every race we go to, Gil Jr.—out of the blue—asks me for a five-link conversion kit, or something like that, to put on somebody's car to see what it might do. Ha! Not seeing my wife and kids for a week at a time is definitely one of the toughest parts. It's really rough on my girls, although my wife probably likes having a break from me.

RCCA: Do you have any travel tips for racers?

RT: If you're going to fly, buy your plane ticket as soon as possible, sign up early and get your room reservations as early as possible. Call the track and find out what kind of tires they are using, and keep the parts you take with you to a minimum.

RCCA: I really dug that ride you gave me in your hot-rod Civic at the Reedy Race. What's under the hood?

RT: Well, for starters, I took the stock 70hp engine out and transplanted a 170hp twin-cam VTEC engine in its place. Since then, I've added cams, headers and all kinds of other goodies, and now it puts out 200hp at 8,500rpm. That might not sound like much, but in a 2,400-pound car, it gets me through the quartermile in 13.1 seconds at 103mph. I know I will run in the 12s; I just need more practice with my launches.

RCCA: Are you one of those streetlight-to-streetlight kind of guys, or do you strap on a helmet and race on a track?

RT: I've only raced it in competition once; that was in Phoenix, where I qualified second and finished second in my class. I don't usually race on the street, but occasionally, I run into some guy in a Mustang who wants to mess with me, and he is usually surprised by how quick my Civic is. Wait until I install a bigger motor, lighten it up and lay down some custom paint. My goal is to run 11s; then we'll go turbo! Yeah, right; my wife would probably kill me if I did that.

UNDER THE HOOD

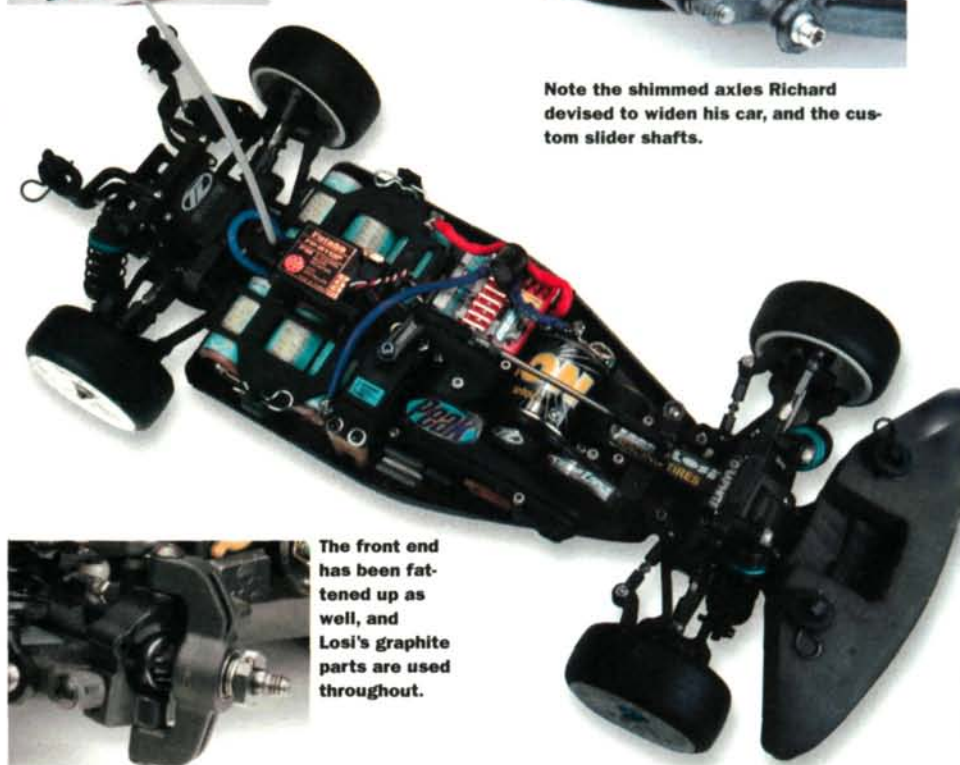
RICHARD TRUJILLO'S **LOSI STREET WEAPON**
ROAR Nats stock TQ and Reedy TC Race stock winner



Of course Richard's Street Weapon was the stock class Reedy Touring Car race winner; Brian was driving!



Note the shimmed axles Richard devised to widen his car, and the custom slider shafts.



The front end has been fattened up as well, and Losi's graphite parts are used throughout.

HIGH-BITE ASPHALT SETUP

	FRONT	REAR
Ride height	0.100 in.	0.125 in.
Shock limiters (inside/outside)	0.060/0.180	0.030/B spacer
Piston	60	56
Oil	80WT	80WT
Spring	Black	Black
Swaybars	None	None
Camber	1.5°	1.5°
Caster	7°	None
Anti-squat	None	2 (no shim)
Toe-in/out	3 (out)	3 (in)
Upper shock mount	Position 2	Position 2
Lower shock mount	Outside hole	Outside hole
Inner camber mount	Position 1	Position 5.5
Outer camber mount	None	Position C
Hole in carrier	Top	—
Ball stud location	Bottom of steering block	—
Ball stud washers	None	—
Ball stud washers (carrier)	A spacer	—
Steering bellcranks	Ball stud in inner position	—
Clicker adjustment	Locked	—
Battery placement	—	Toward the back

MODIFICATIONS

Richard widened his car 0.080 inch on each side up front and 0.100 inch per side in the rear. To accomplish this, he reamed the inside of the front spindle carrier to allow the larger 3/16-inch I.D. bearing to fit deeper in the carrier. He used a set of 3/16-inch MIP CVDs and three axle shims (on each axle) to complete the installation. He replaced the stock, rear universal drive shafts with custom-length Losi sliders, axles and axle shims, and this slightly widened the vehicle's rear end.

MISCELLANEOUS

BODY: Losi Stratus
MOTOR: 24-degree ROAR stock motor (handout)
BATTERIES: Peak Performance RC2000
SPEED CONTROL: Novak Cyclone TC
RADIO: Airtronics M8
RECEIVER: Novak XL
TIRES: Pro-Line LP Slicks (S3 compound)
INSERTS: Yokomo 37M
GEARING: 28/82

FACTORY OPTIONS

■ Stock IWC Street Weapon with titanium screws, low-friction belts and aluminum top shaft and lay shaft.



HOT MOD HOW TO

RACE-PROOF YOUR CAR'S FUEL TANK

Have you ever had your nitro rig stall out in the middle of a race, only to find that the fuel or pressure line has slipped off the tank's molded-in, fuel- or pressure-line pick-up? Believe me; this happens all the time. Although it will help keep the fuel and pressure lines in place if you install a cable tie or an additional piece of fuel tubing over the fuel line where it slips onto the pick-up, this method doesn't always work and could fail at the most inopportune moment. The methods outlined here will ensure that your fuel and pressure lines never again slip off the fuel tank's pick-ups during a race.

■ STEP 1. Carefully saw off the fuel tank's pressure-line pick-up with an X-Acto cross-saw. Be sure not to saw off the fuel-line pick-up by mistake. The fuel-line pick-up is usually on the bottom of the fuel tank, but sometimes, it's on top next to the pressure-line pick-up instead, so be extra cautious. I'm modifying a Tamiya TG-10 fuel tank in the photos.



■ STEP 2. Slightly enlarge the hole in the fuel tank (where the pick-up used to be) so you'll be able to thread in the pressure fitting. Use a 4-40 tap, reamer, or $\frac{3}{32}$ -inch drill bit to ensure that you do not make the hole too big; a hobby knife may also be used, but be careful with it. When you've finished, use denatured alcohol to flush any plastic bits out of the tank, and let it air dry completely. Any remaining particles can be blown out with compressed air.



■ STEP 3. Attach the pressure fitting to the fuel tank. You can use a straight pressure fitting or a 90-degree fitting, as shown in the photo. Partially thread the pressure fitting into the hole, then apply a drop of silicone sealant on the remaining threads before you completely tighten the pressure fitting. Be sure not to overtighten the pressure fitting because if you strip the plastic, the tank will pretty much be ruined. The pressure fitting grips the pressure line with more security than the molded-in pick-up, and it will never let go of the line.

■ STEP 4. Now we'll go to work on the fuel pick-up. I do not recommend that you replace the molded-in fuel-line pick-up with a pressure fitting because it will restrict fuel delivery. Applying a drop of silicone sealant on the pick-up and then slipping the fuel line over the pick-up will ensure that the fuel line stays in place, though. The sealant is impervious to nitro fuel and will keep the fuel line secure yet it can easily be removed for maintenance. Just make sure the glue does not seal the hole in the pick-up; if it does, fuel will not be able to reach the carb. Allow the glue to cure overnight before you fill the tank.



THINGS YOU'LL NEED

- Pressure fitting (available through OFNA*, GS Racing* and others).
- Silicone sealant or RTV.
- Applicator brush.
- Rags.
- X-Acto modelers' cross-saw.
- Denatured alcohol.

*Addresses are listed alphabetically in the Index of Manufacturers on page 208. ■

LAST LAP

Who's the best RC racer, and why?

That's a tough question because I think some racers are better at one form of racing than another. For instance, I'd have to say that Brian Kinwald is currently the hottest electric off-road racer, but David Spashett rules in electric on-road. Richard Saxton, in my opinion, is the best off-road gas racer, and Masami Hirotsuka is probably the best touring-car racer.

—Mark Sheriff

If I had to choose just one driver, I'd say Masami Hirotsuka is the best all-around racer because he has won nine world championships. He has won 2- and 4WD off-road championships, and $\frac{1}{12}$ - and $\frac{1}{16}$ -scale on-road championships as well. Hirotsuka is equally fast on dirt or pavement, and he's also a really cool RC spokesman.

—Martin Huang

There are just too many good drivers to choose only one. I give Brian Kinwald the nod for best off-road racer, but I can't decide between Joel Johnson and David Spashett for best on-road racer. What about gas off-road or $\frac{1}{8}$ -scale on-road? Those classes have great drivers, too.

—Nestor Morales

Brian Kinwald is the best off-road racer, and David Spashett is the undisputed on-road champion. My opinions may change after the next IFMAR On-Road and Off-Road World Championships, though.

—Mario Issara

I don't know who the best driver is, but Matt Francis is definitely my favorite driver. He's not real into himself, you know? He's totally into talking to people and helping them out and stuff.

—Lance Goodwin

From what I've read in *RC Car Action* and heard people say, Masami and Joel Johnson are supposed to be like robots or something—no mistakes. I guess they're the best, but I think Masami is the best all-around because he races on- and off-road.

—Charles Bailey

I think $\frac{1}{12}$ mod is the toughest class to race, and anyone who's good enough to be world champ in $\frac{1}{12}$ is my pick. So I guess I'm saying David Spashett.

—David Raynal

NEXT MONTH'S QUESTION

Should ROAR and IFMAR approve GT1-style bodies for sanctioned touring-car racing?

Email your responses to

george@alrags.com.

Type "Last Lap" in the subject box.

2000 REEDY RACE OF

by George M. Gonzalez

KINWALD TAKES 10

It's hard to believe that the Reedy International Race of Champions, one of the oldest annual, non-sanctioned, off-road racing events, has been around for 14 years. I'm sure legendary motor-builder Mike Reedy agrees because the race is his yearly birthday party in the guise of an RC racing event. Although dubbed an "international" event, this year's race participants were all Americans; prominent Japanese and European drivers were unable to attend. The action in the invitational class (comprised of invited star drivers, as the name implies) was hot, and all 150 slots filled up quickly in the 2WD and 4WD open classes, which were available to all racers.

An interesting thing about the Reedy Race is that a different team and different drivers win the event every year. Team Trinity/Team Losi drivers Brian Kinwald and Trevor Adamo dominated every class at this year's event; they won their respective classes by huge margins. You might be thinking that we gave away the end of the story in the previous sentence, but there's a lot more to this event than just the headlines. You'll find all the action from the 14th Annual Reedy Race of Champions on the following pages, so read on.

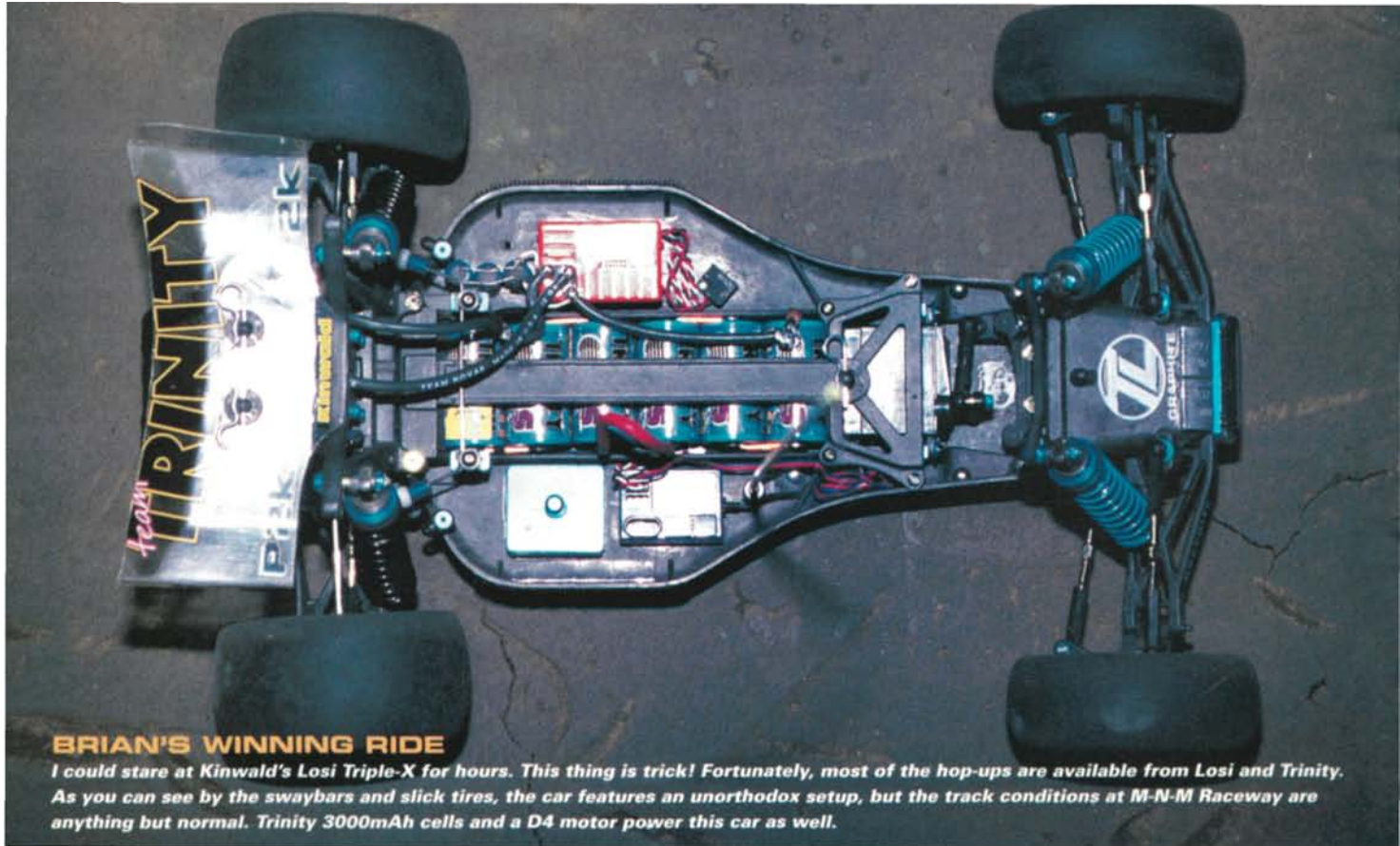
14th ANNUAL REEDY

CHAMPIONS



RACE OF CHAMPIONS





BRIAN'S WINNING RIDE

I could stare at Kinwald's Losi Triple-X for hours. This thing is trick! Fortunately, most of the hop-ups are available from Losi and Trinity. As you can see by the swaybars and slick tires, the car features an unorthodox setup, but the track conditions at M-N-M Raceway are anything but normal. Trinity 3000mAh cells and a D4 motor power this car as well.

A BRIEF EXPLANATION

Every year, the top racers are invited to compete in a special Invitational class that's actually a 12-round exhibition race. Points are accumulated according to the racers' finishing positions (1 point for first place, 2 points for second, 3 for third, etc.). The driver's worst score from each heat is thrown out and used only as a tiebreaker, so only 11 of the 12 rounds count toward a driver's final score. This is a showcase event that traditionally attracts busloads of spectators, and this year's event was no exception; the track was completely surrounded by excited onlookers during all of the Invitational class heats.

The Invitational drivers compete in six rounds of 2WD on Saturday and six rounds of 4WD on Sunday. Their scores were tallied daily so the drivers and spectators could be kept up to date on the scoring.

Tyree Philips of Novak (one of the event's principal sponsors) kept score on his laptop and printed out data sheets after every round. Thanks, Tyree!

Open Modified classes in 2- and 4WD were also held, and the first 150 racers who signed up were able to race. As usual, the slots filled up quickly; many racers had to be turned away. The winners of the Open classes are invited to compete in the next Invitational, so competition to get into the Open is always fierce. The Open class drivers had four rounds of qualifying, and the winners were decided in a single main event.

2WD AND 4WD OPEN

- **2WD.** Team Trinity/Team Losi driver Trevor Adamo ended up with the TQ after barely edging out Josh Anderson's Reedy-powered Associated B3 by a fraction of a second.

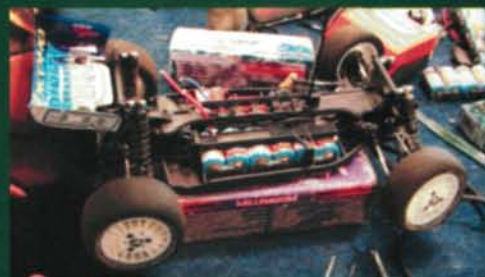


Brian's Losi XX-4 was also dialed to perfection and was clearly the fastest car at the event. This car is loaded with hop-ups and custom Kinwald innovations. Trinity 3000mAh NiMH cells provided the juice, and a D4 modified motor gave him the hole shot every time.

YOKOMO MR-4BC MAKES ITS RACING DEBUT

Although marketed as an entry-level 4WD buggy, the Yokomo MR-4BC was used by most of the Team Yokomo drivers and some independent drivers as well. Check out Mark Pavidis' buggy, and you'll immediately spot some of the hop-ups that he used. The most notable components are the graphite composite chassis, shock towers, suspension arms and MR4-TC one-piece upper deck. He also used hard-anodized shocks, titanium tie rods, MIP CVDs and Yokomo's optional low-friction drive-train components. Mark's car is equipped with Reedy's latest 3000mAh cells and a Millennium Wind (MW) motor.

So how did the BC do at the Reedy Race? Actually, not very well. Most drivers had insufficient wheel time with the new buggy, and the car was not prepared for M-N-M Raceway's unique track conditions. As a result, the Team Losi XX-4 secured every spot on the 4WD Open A-main, but Pavidis and Barry Baker used MR4-BC buggies to win a couple of heats during the 4WD competitions.



Reedy HALL OF FAME

I've been keeping statistics on the Reedy Race for years, and each year, I post a Reedy Hall of Fame. Brian Kinwald now enters the record books as the fourth driver to win twice at the Reedy Race. Masami Hirosaka, Cliff Lett and Mark Pavidis have each won twice as well. Kinwald, Pavidis and Hirosaka all have a shot at "three-peating" next time (Cliff Lett has retired from racing). Masami missed the most recent Reedy Race and the one before that, too, and quite frankly, we all miss him! Here's hoping he'll be able to make the next Reedy Race.

PAST REEDY RACE CHAMPIONS:

Chris Alec—Associated
Mark Francis—Associated
Masami Hirosaka—Yokomo (two wins)
Greg Hodapp—Losi
Rick Hohwart—Associated
Brian Kinwald—Losi (two wins)
Jeremy Kortz—Losi
Cliff Lett—Associated (two wins)
Chris Moore—Kyosho
Mark Pavidis—Associated (two wins)

Anderson threatened Adamo during the first couple of laps in the A-main, but Anderson's car broke and was out for the count. This left Adamo with nearly a half-track lead on Shawn Blackwell. Adamo easily won the Main with a 4-second cushion over Blackwell; Ryan Cavallieri claimed third.

• 4WD. Trevor Adamo was the man to beat in this class, too. He ended up in the TQ spot, but Gene "The Machine" Hickerson's

Peak-powered Losi XX-4 was only one second slower. Adamo shot out in front at the start of the 4WD Open A-main and didn't look back until he realized that the race was over and he had lapped everyone on the track. Mike Kendall won the battle for second, and Brent Thielke claimed third. Adamo automatically qualifies for the Invitational class at the next Reedy Race.

THE INVITATIONAL

The competition is usually very tough in this class, and there's rarely a clear winner. This time it was different, though; after winning five of six heats in both 2- and 4WD, Team Trinity/Team Losi factory driver Brian Kinwald was unquestionably the victor. This gave him a perfect score of 10 points after the throw-out rounds were deducted, and he was declared Reedy Race champion for the second time in his career. Only one other driver has ever earned a perfect score at a Reedy Race: the legendary Cliff Lett. Team Trinity/Team Losi driver Mark Francis won four of his 2WD heats and three of his 4WD heats to score 16 points and secure the second-place trophy. Adam Drake finished with 21 points—good enough for third.

FINAL THOUGHTS

The 14th Annual Reedy International Race of Champions was just as exciting as the 13 that preceded it. The folks at M-N-M Raceway in Corona, CA, have graciously hosted this event for the past three years, and as always, they did a fantastic job. Congratulations to newly crowned champions Brian Kinwald and Trevor Adamo for their fantastic performances, and many thanks to Novak for its continued support. Hope to see you all there next year. ■



Trevor Adamo's Open class-winning Losi vehicles. Trevor finished with a cool, 4-second margin in 2WD and lapped the field in 4WD. As you can see, he knows how to pay his bills.

Here is one of the few things Mike Reedy enjoys more than RC racing. Mike's grandson, Cody Westman, came by to wish his grandpa a happy birthday—and to watch those neat little cars run around the track.



INVITATIONAL

FIN.	DRIVER	POINTS
1	Brian Kinwald	10
2	Mark Francis	16
3	Adam Drake	21
4	Billy Easton	22
5	Todd Hodge	24
6	Jimmy Jacobson	25
7	Mark Pavidis	26
8	Jason Corl	29
9	Matt Francis	29
10	Barry Baker	31

4WD OPEN

FIN.	QUAL.	DRIVER	CAR	ESC	MOTOR	BATTERY	TIRES F/R	RADIO
1	1	Trevor Adamo	Losi XX-4	Novak	Trinity	Trinity	Losi	Airtronics
2	3	Mike Kendall	Losi XX-4	Tekin	Peak	Peak	Losi	Airtronics
3	4	Brent Thielke	Losi XX-4	Novak	Race Prep	Pro Match	Losi	Airtronics
4	7	Jason Moberly	Losi XX-4	GM	GM	GM	Losi	Hitec
5	2	Gene Hickerson	Losi XX-4	Tekin	Peak	Peak	Losi	N/A
6	6	Jake McGarvey	Losi XX-4	Novak	Trinity	Trinity	Losi	Airtronics
7	5	Shawn Blackwell	Losi XX-4	Novak	GM	Trinity	Pro-Line/Losi	Airtronics
8	8	Ryan Cavallieri	Losi XX-4	Novak	Trinity	Trinity	Losi	Airtronics
9	10	Greg Monise	Losi XX-4	Tekin	Orion	Orion	Losi	Airtronics

2 WD OPEN

FIN.	QUAL.	DRIVER	CAR	ESC	MOTOR	BATTERY	TIRES F/R	RADIO
1	1	Trevor Adamo	Losi XXX	Novak	Trinity	Trinity	Losi	Airtronics
2	5	Shawn Blackwell	Associated B3	LRP	GM	Trinity	Pro-Line	Airtronics
3	7	Ryan Cavallieri	Losi XXX	Novak	Trinity	Trinity	Losi	Airtronics
4	3	Mike Kendall	Losi XXX	Tekin	Peak	Peak	Losi	Airtronics
5	6	Gene Hickerson	Losi XXX	Tekin	Peak	Peak	Losi	N/A
6	8	Brent Thielke	Losi XXX	LRP	Race Prep	Pro Match	Losi	Airtronics
7	10	Brian Kadar	Losi XXX	Novak	Trinity	Trinity	Losi	Airtronics
8	10	Greg Monise	Losi XXX	Tekin	Orion	Orion	Losi	Airtronics
9	9	Derek Pocoroba	Losi XXX	Novak	Trinity	Trinity	Losi	Airtronics
10	2	Josh Anderson	Associated B3	LRP	Reedy	Reedy	Losi	Airtronics

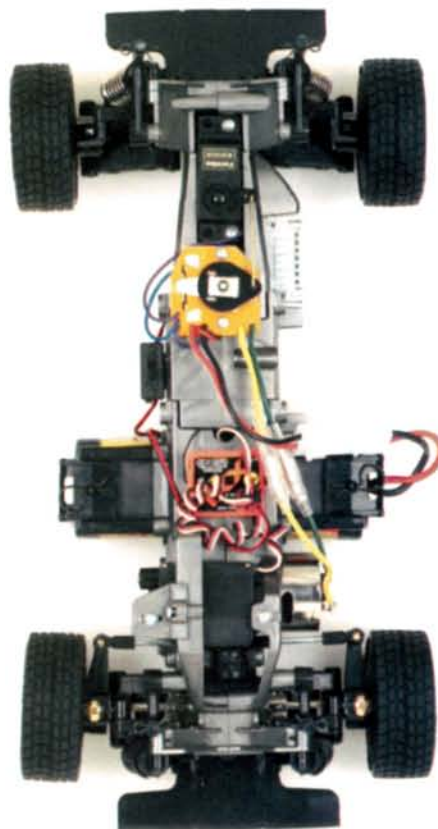
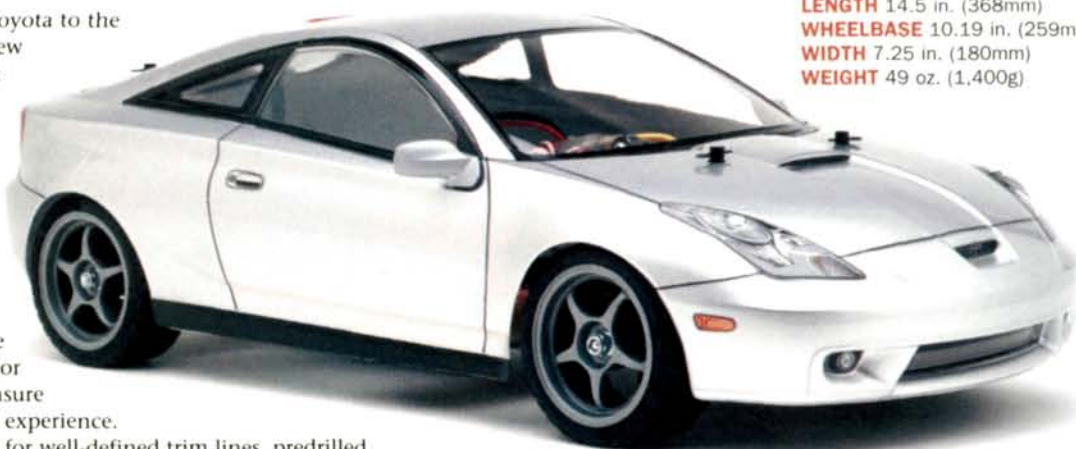
Tamiya FF02 Toyota Celica

by Kevin Meyer

Big T almost beat Toyota to the punch with the new Celica. The 1/10 kit hit the pages of this mag as the full-size car hit the streets! Tamiya's* durable FF02 sectional chassis has slots in the sides that lighten it and give it a high-tech look. The best in the biz, Tamiya's hall-mark body combines scale appearance with a full-color vinyl detailing sheet to ensure an all-around exciting RC experience.

Tamiya gets extra credit for well-defined trim lines, predrilled mounting holes and window masks. These little extras ensure quick, clean detailing. The car is easy to build; like a good book, once you start it, it's hard to put down. Excellent instructions and high-quality parts play a big role in helping the project go smoothly from start to finish.

LENGTH 14.5 in. (368mm)
WHEELBASE 10.19 in. (259mm)
WIDTH 7.25 in. (180mm)
WEIGHT 49 oz. (1,400g)



PERFORMANCE

The car is at home on unprepared surfaces. It took a few battery packs to get the hang of cornering with the FWD chassis. Instead of powering through the corners, as you'd do with 4WD, you need a smooth throttle finger to track the car through the turns easily.

Color-coded front and rear springs help keep the front wheels planted. The kit tires didn't come with foam inserts, but traction improved once the radial treaded tires had been scuffed up a bit.

In stock form, the Celica's top speeds are respectable—almost fast; a competition stock motor will really bring it to life. The Celica is fun to drive, and those who want to coax more performance out of it will find plenty of hop-up parts.

REQUIRED ACCESSORIES

- 2-channel radio and receiver.
- Two servos or one servo and an ESC.
- 6-cell stick pack and charger.
- Polycarbonate-compatible paint and polystyrene-compatible paint (for the mirrors).
- CA glue (for tires).

FEATURES

- FWD mid-motor chassis design.
- Heavy-duty, metal-gear differential.
- 540 sport motor with included pinion gear.
- Friction-type shocks with color-coded springs.



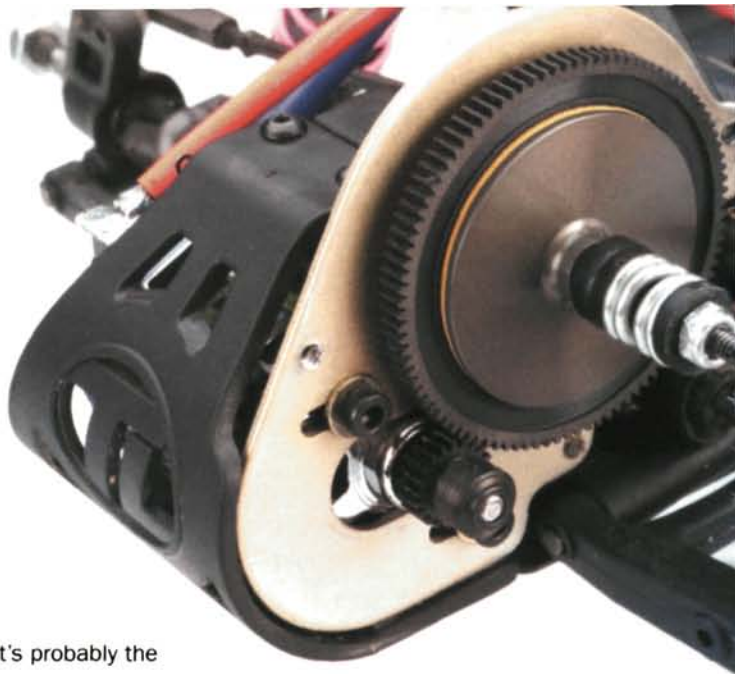
PHOTOS BY WALTER SIDAS

*Addresses are listed alphabetically in "Featured Manufacturers" on page 208. ■

Gear ratios

Everything you need to know

by Peter Vieira



When a racer talks about his car's gear ratio, he usually means this: the pinion and spur gear. However, these gears are only part of the total gearing package.

WHAT GEAR ARE YOU RUNNING? That's probably the most asked question among racers setting up for a new track. No matter how big your batteries are or how much motor you have, the wrong gear ratio can keep you out of competition. Even if you just want to hack around with your RC car or truck, an understanding of how gear ratios affect your vehicle's performance will help you enjoy your machine more; if you want to maximize your run time or have the fastest car in the neighborhood, you need to know gears. With some simple math and just a little imagination, it's easy to visualize how gear ratios "work." Break out your pit-box calculator (you've got one in there, right?), and get ready to number-crunch your way to a new level of RC understanding.

WHAT IS A GEAR RATIO?

Any two gears will have a "ratio"; if your car has a 20-tooth (20T) pinion and a 100-tooth (100T) spur gear, that's a 20:100 ratio. We need to go one step further, however, and divide the number of teeth on the spur gear (100) by the number of teeth on the pinion (20). It's easy:

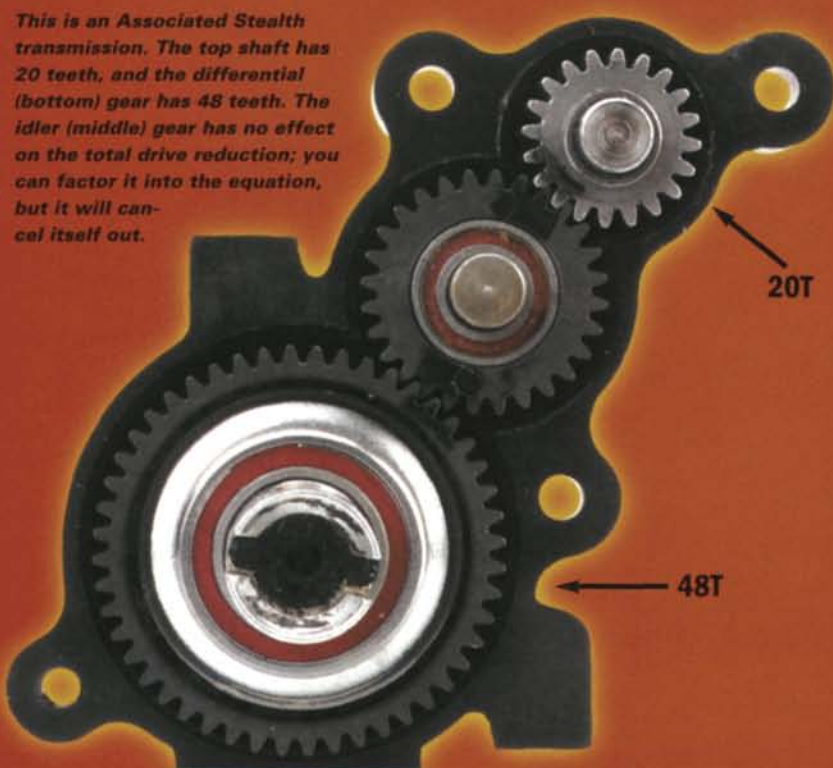
$$100 \div 20 = 5$$

The gear ratio is 5:1 (say "five to one"), which means that the pinion must make five revolutions to turn the spur gear one revolution. It's that simple.

HOW DO I USE THIS INFORMATION?

Let's say your friend's car is running well; it has good acceleration and top speed, and the battery lasts long enough to finish the race plus a lap or two. You have the same car, same motor and a battery of

This is an Associated Stealth transmission. The top shaft has 20 teeth, and the differential (bottom) gear has 48 teeth. The idler (middle) gear has no effect on the total drive reduction; you can factor it into the equation, but it will cancel itself out.



WHAT



32-pitch

PHOTOS BY WALTER SIDAS

PERFECT PITCH

The pitch of the gears in your car has no effect on their ratio; a 100T-spur/20T-pinion combination is a 5:1 ratio whether you use 32-, 48-, or 64-pitch gears. Certain types of gears, however, are better suited to certain applications than others.

• 32 PITCH

You don't much find this chunky gear pitch on electric vehicles any more, but gas cars often use 32-pitch gears to cope with the heavy horsepower their transmissions must cope with. The only larger tooth profile in RC is "1 module," which works out to 24.5 pitch; this is the gear type used by HPI's Nitro RS4 series. Robinson Racing offers a 32-pitch gear conversion set for these vehicles.

• 48 PITCH

Robinson Racing* deserves credit for popularizing 48-pitch gears in off-road; until Rob Robinson developed the "in-between" pitch years ago, racers had to choose between 32-pitch gears (durable, but limited in gearing options) or 64-pitch (plenty of gearing options, but the tiny teeth were easily stripped); 48-pitch gears remain the off-road standard, and they offer a good mix of ratio options and durability.

• 64 PITCH

This is the pitch of choice among pan-car aficionados due mainly to the huge number of available ratios and extra-smooth mesh of the very fine teeth. Since pan cars don't have to endure jumps and jolts, and the lightweight cars don't strain the gears like heavier off-road cars, 64-pitch gears hold up well.

• BK PITCH

Meet the new kid on the block. Trinity's BK gears are actually 56 pitch, which makes them finer than 48-pitch but not as fine (or fragile) as 64-pitch. BK gears are ideal for racers who would like to streamline their pit boxes, since 56-pitch is good for both off-road and on-road cars. The BK gears feature the same hard-anodized-aluminum construction as Trinity's Hard Ones pinions and machined Zero Gravity spur gears. Two types of spur are offered: a universal style to fit pan-car diffs and "two-hole" Associated-type transmissions and a keyed model for all Losi vehicles.

UNDERSTANDING METRIC PITCH

You may have heard of "metric 64 pitch" or "metric 48 pitch." Both types of gear are common to Tamiya kits. The correct term for the pitch of these gears is "module"; 0.6-module gears are "metric 48" and are actually 42.3 pitch; "metric 64" gears are 0.4 module and are actually 63.5 pitch. Always use metric pinions with metric spurs; although the pitch is close to U.S. 48 and 64 standards, they are not interchangeable.

Both of these pinions have 21 teeth; the bottom pinion is "metric 48" pitch, while the top gear is standard 48 pitch.



equal capacity, so you want to use his gear ratio. Let's use the same example and say he has a 20T pinion and a 100T spur for a 5:1 ratio. However, you don't have a 100T spur of your own; your only spur gear is a 125T. What pinion should you use? Divide the spur-gear teeth by 5 (since you're aiming for a 5:1 ratio) to find out:

$$125 \div 5 = 25$$

You should use a 25T pinion. Even though you have bigger gears than your friend, the ratio is still the same—5:1.

IS IT REALLY THAT EASY?

It can be, if you swap gear ratios between identical cars; but there's more to consider, if you want to set up your car with the same ratio as a different brand of vehicle. To do that, you need to know the transmission ratio.

CALCULATING TRANSMISSION RATIO

Any car with a gearbox has some type of internal gear reduction; most cars and trucks use a "3-gear" transmission, which features a top or "input" gear, an idler gear and a bottom gear that spins the drive axles and incorporates the differential. To determine the transmission ratio, just divide the number of teeth on the diff (bottom) gear by the number of teeth on the top gear (if you're working with a belt-drive car, just count the teeth on the pulleys. Divide the number of teeth on the differential pulley by the number of teeth on the layshaft pulley to determine the car's transmission ratio). For example, an Associated RC10B3 gearbox has a 20-tooth top gear and 48-tooth diff gear:

IS "PITCH"?



48-pitch



BK
56-pitch



64-pitch

IN THE MOST SIMPLE TERMS, pitch is measured as the number of teeth that can fit on a gear with a diameter of 1 inch; for example, a 1-inch gear with 48 teeth on it has 48-pitch teeth. To squeeze 64 teeth onto a 1-inch disc, the teeth must be made smaller to fit; that's why 64-pitch gear teeth are finer than 48-pitch. As the pitch number gets larger, the teeth get smaller.

With the exception of the 18-tooth, 32-pitch pinion, each of these pinions has 24 teeth. Note the size of the teeth and the overall size of the gear. From left to right: 32, 48, BK (56) and 64 pitch.

$$48 \div 20 = 2.4$$

The ratio is 2.4:1. Once you have determined the transmission ratio, you can match your gear ratio to anyone else's. Here's how it works:

Let's say you're using that 20T-pinion/100T-spur combo in your Associated RC10B3, which has a transmission ratio of 2.4:1. To find the total drive reduction of your transmission, spur gear and pinion combination, you must multiply the transmission ratio by the pinion/spur ratio:

$$2.4 \times 5 = 12$$

The total drive reduction is 12:1. That means the pinion must turn 12 times to turn the diff gear (and the rear wheels) one complete revolution. Armed with this knowledge, let's match this setup to a car with a different ratio. Let's say, it's a 2.3:1 transmission ratio.

Start by dividing the desired result (12) by 2.3:

$$12 \div 2.3 = 5.2$$

Now we know we need a pinion-/spur-gear ratio of 5.2:1. We can calculate that by dividing our spur-gear tooth count by 5.2. Let's say we have a 100T spur:

$$100 \div 5.2 = 19.23$$

Great! If we had a 19.23 tooth pinion, we'd be all set. Of course, gears don't have fractional teeth (unless you break a tooth!). You can quit now and run a slightly lower gear ratio by installing a 19T pinion, or gear slightly taller with a 20T pinion. If you want that elusive 100-percent equal ratio, you'll have to keep looking for a pinion/spur combo that delivers a 5.2:1 ratio. Instead of working back from the spur gear, try working from the pinion. A nice, even number should work; let's try a 20T pinion. Just multiply it by the desired ratio

$$5.2 \times 20 = 104$$

And there it is: a 20T pinion and a 104T spur deliver a perfect 5.2 ratio. Multiply 5.2 by the tranny ratio (2.3), and you get 11.96; that's about as close to the desired 12:1 ratio you can get.

BUT WAIT. THERE'S ONE MORE "GEAR"

Although they have tires instead of teeth, the drive wheels of your car or truck can be thought of as gears in the transmission.

PINION OR SPUR: WHICH TO CHANGE FIRST?

Most racers leave the same spur gear on the car or truck all day (if not all season) and change only the pinion. That's usually OK, but if you want to make very fine gear-ratio changes, try going up or down a tooth on the spur gear instead of on the pinion. For example: one tooth change on a 100-tooth spur gear is equal to $\frac{1}{100}$ or 1 percent, while a 1-tooth change on a 20-tooth pinion represents $\frac{1}{20}$ or 5 percent. If you want to gear just a little higher or lower, but you're afraid a change of one full tooth on the pinion will be too much, go up or down on the spur instead. Even a 2-tooth change on the spur will generally be less of a jump than a 1-tooth move on the pinion.

THE POWER...



VECTOR
V-SERIES

SPEC 2000 FEATURES

- Narrow rear end conversion-set (extra) quicker steering response
- Aluminium wheel-adaptor set front/rear, fixed (extra)
- Conical wheel-shim set front/rear
- Carbon shock support rear and ball-type shockmounting-set
- Adjustable rear anti-roll bar set (extra)

The ultimate 1/8 scale racing chassis

The Vector 1/8-scale R/C car takes gas racing performance to new extremes. Vector, the pinnacle in RC racing technology, setting new standards in RC engineering, styling, quality and performance. Original design, others follow...

- 1997-1998 IFMAR World Champion
- 1999 ROAR National Champion

Novallmega SX-21 EV4
#2801MS

WORLD CHAMPIONSHIP PERFORMANCE PRODUCTS



Serpent USA Inc. 2830 NW 79 Ave. Miami, FL 33122 Phone (305)639-9665 Fax (305)639-9658 E-Mail info@serpent-usa.com

Think about it; if you take two identical cars with identical gear ratios and put small-diameter tires on one and large-diameter tires on another, the vehicle with larger tires will travel farther with each rotation of the wheels and is effectively geared taller than the small-tire car. To truly understand your car's total gearing package, you must take the size of the drive wheels into account.

The distance traveled by the tire in one rotation is its circumference. To measure it, mark the sidewall of the tire, roll it until the mark makes a complete rotation, then measure the distance. Or, calculate the circumference by multiplying pi (3.14) by the tire's diameter. For example, if the diameter of your car's drive tires is 87.3mm, the circumference is:

$$3.14 \times 87.3\text{mm} = 274.1\text{mm}$$

If we divide that number by the total drive reduction of our example RC10B3 (12:1), we get this result:

$$188.4 \div 12 = 22.8$$

That means the car travels forward

22.8mm for each revolution of the pinion gear. In racer-speak, that's the "rollout" for the car. No matter what we use for a car, or gears, or a transmission, any car set up with 22.8mm rollout will be geared exactly the same as the example RC10B3.

This information is also invaluable when changing your car's tires; if you know your rollout with a set of low-profile tires is correct for the track, but you need to install a larger tire for more traction, you'll be able to readjust your gearing to deliver the same rollout.

PUTTING IT ALL TOGETHER

Now that you understand how the pinion and spur ratio, transmission reduction and tire circumference work together to deliver a total gearing package, you can match anyone's successful setup. But what if you don't have a setup to start with? Here's how to get your gearing dialed in:

1. Start with the manufacturer's suggested gear ratio. Most race kits include some type of gear chart with ratio suggestions for stock motors and popular mod winds. Pick the ratio that is closest to your application.
2. Install the pack and motor you plan to

race with, and run at race pace for however long your heats are.

3. Count the number of laps you can complete after the "heat" is over. If you can get in one or two race-pace laps without dumping, you can safely gear higher. Go up a tooth on the pinion, recharge your pack and go out again. You should find that your car is faster on the straights. Does it still have enough punch when accelerating out of turns? If possible, have someone time your laps instead of relying on feel.

4. If you're turning faster laps and still making run time, you can try going up another tooth—but there is a point of diminishing return. For example, today's 3000mAh "super packs" have so much capacity that you might be able to gear your car to the moon and still make run time—if you don't smoke the motor. Gear up until your lap times slow or you can't make run time; then use the ratio that gave you the fastest lap times.

That's basically it! Armed with a calculator and some practice time (and a stash of pinion and spur gears), there's no situation you can't gear for. See you at the track.

**Addresses are listed alphabetically in "Featured Manufacturers" on page 208. ■*

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**NOVA
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RACING ELECTRONICS

How to turn your stock Tamiya Clod Buster into the ultimate monster

For years, you have been seeing decked-out Tamiya* Clod Busters on our pages, and we've received all sorts of letters and emails asking us how to build one of these killer trucks. This month, I cover the basics of converting your Clod into an aftermarket chassis setup using a Bennett Equipment* Clod-A-Leaver IIR chassis. Even if you aren't going to run a Bennett, many steps will be very similar.

GET THOSE GEARBOXES

The only stock Clod Buster parts required for a typical, aftermarket chassis conversion are the two complete gearboxes (which include gears, pilot shafts, axles, bearings, gearbox halves, axle tubes and outer hub assemblies) and the tires and rims. If you already have a complete Clod kit, tear it down and set these assemblies aside. If you're starting from scratch with a new truck, build the front and rear gearboxes only.

Whether you build new transmissions or retrofit old ones, now is the time to replace bearings with bushings. Already have bearings? This is a good time to clean and relube them.

The front and rear trannys are all you need from your stock kit to build the featured truck. This transmission is ready to be bolted to the frame.



You can gain a little more steering by cutting off the molded stops on the axle. The left axle has the stops, and the right one has been modified with a cut-off disc and a rotary tool.



Here's something you don't see too often in the pages of RC Car Action—a stock Tamiya Clod Buster. You won't need too many of its parts to build the modified Clod.

nuts. Before installing the studs, put a drop of thread-locking compound on their threads. Assemble the suspension links, noting the lengths specified in the instructions. On most kits, the lengths of the upper and lower links differ.

Having assembled the links and made sure that they are the right lengths, attach them to their designated locations on the gearboxes, then attach the suspension/gearbox assemblies to the chassis. On most kits, the suspension arms are attached to the chassis with a screw and a nut. These screws don't fit tightly in the holes they go through, and that could throw off the gearbox alignment. Check to make sure that the gearboxes are parallel to the chassis cross-members before you move on with the assembly.

START BUILDING

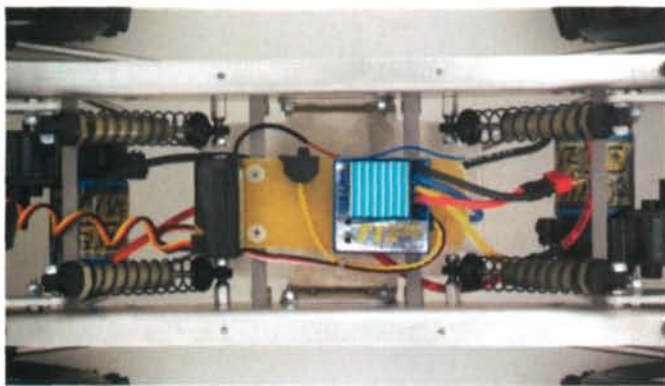
I like to start with the chassis. On some kits, the chassis is ready for the suspension and transmission components right out of the box; others require assembly. Regardless of which type you have, it's wise to have your shocks assembled and ready for installation before you begin. Shocks are sometimes integral to the chassis' structure, and the chassis can't be completed without them.

Some kits feature tubular aluminum suspension links with threaded studs secured by jam

STEERING

I prefer 4-wheel steering; when set up correctly, it works very well. Most drivers prefer 2-wheel steering though, so they lock out the rear steering mechanism. If you would like to take this route, remove the outer hubs and the kingpin washers from the rear gearbox, then reinstall the hubs and tighten down the screws to bind up the steering hubs (make sure the wheels are pointing straight ahead when you this).

You can then disconnect the rear servo linkage from the servo.



This shows perfectly why you should have the shocks picked out and built before you start to build one of these kits. One of the first steps in building this Bennett rig is mounting the shocks on the frame halves.

The wheels will be locked, but a hard hit will throw them out of alignment. Thunder Tech Racing*, New Era Models* and Sassy Chassis* all offer rear-steering lockout systems as options for their chassis kits.

If you go with 2-wheel steering, you will have somewhat limited steering because of the molded-in steering stops at the end of the axle tubes. If you want more steering, you can cut these stops off.



A completed Bennett Equipment Clod-A-Leaver IIR racing truck ready for action. As you can see, it looks nothing like the stock truck.

MOTOR WIRING

The motors can be wired in a couple of ways. If you prefer longer run times to maximum horsepower, wire your motors in series. Here's how:

- First, connect the ESC's positive wire to the front motor's positive terminal.

- Next, connect the front motor's negative terminal to the rear motor's positive terminal.

- Finally, connect the ESC's negative wire to the rear motor's negative terminal to complete the job. For maximum power output (but shorter run times), connect your motors in parallel.

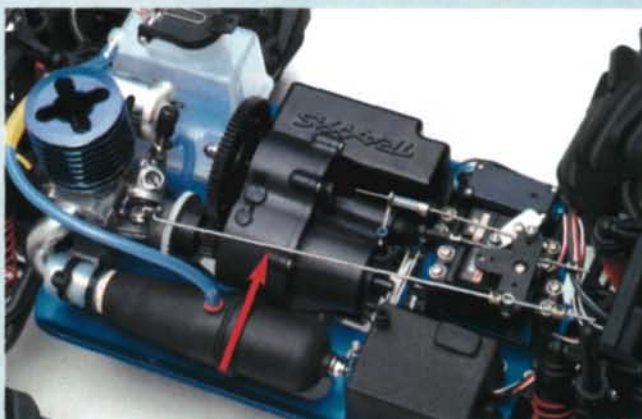
T-MAXX CARBURETOR FIX

If you own a Traxxas* T-Maxx, you may have noticed that it is very difficult to access the carburetor's low-speed needle. It has been set at the factory, and that setting may be OK for break-in, but if you can't access it, you will not be able to fine-tune the engine for maximum performance.

To access the low-end needle, remove the engine from the chassis and take out the carburetor. Apply a little sealant to the carburetor to avoid having air leaks, then install the carb, but rotate it 180 degrees from the stock position. Reinstall the engine, using thread-lock on the screws.

Now you have to rotate the throttle and brake arms 180 degrees as well. Remove the throttle servo horn, rotate it 180 degrees, and reinstall it. You can use the same brake linkage, but you'll have to reinstall the brake actuator arm in the reversed position (see photo). You'll also have to reverse the throttle servo on the radio.

After following these steps, you'll be able to access the low-speed needle without any problem.



The truck's stock linkages work OK, but the throttle linkage can rub the spur gear, and it is almost impossible to reach the engine's low-speed needle (right). The new carburetor setup allows easy access to the low-speed needle, and the linkages are much simpler.

SHOP TALK

After reading the NR/CTPA Worlds article in the March issue, I want to build a "big rig"-class truck. My problem is a lack of information. I have visited various shops and written many letters, but no one has been able to help me. Since you're the truck guru, perhaps you can assist me, oh great one. R.W. Blair Jr.
Philadelphia, PA

When it comes to building pulling trucks, Hooter's Chassis and Hobby Shop in Utica, PA, has everything you need. The personnel are very experienced and always willing to help solve your pulling problems. Give them a call at (814) 425-3122.

If you have any problems or questions about trucks, or if there is something you would like to see in "4x4," email me at kevinh@airage.com or send your letters to: "4x4"

RC Car Action
100 East Ridge
Ridgefield, CT 06877-4606 USA

- First, connect the ESC's positive and negative wires to the rear motor's positive and negative terminals.
- Next, run one wire from the rear motor's positive terminal to

the front motor's positive terminal and another wire from negative to negative.

No matter how you wire your motors, remember to reverse the rear motor's rotation. If

you're uncertain how to do this refer to February's "4X4." That's all until next month, when I'll finish the hard-body painting how to. ■



Thunder Tech rear-steering lockout kit



This simple, effective lockout kit uses graphite rods: one connects the two hubs; the other runs from one hub to a small carbon-fiber plate that is attached to the gearbox. With this kit, your rear wheels aren't going anywhere!

The lockout kit has been installed on the Clod Buster gearbox; no way are those rear wheels going anywhere! The best thing is that it is easy to install.

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Clutch Tuning

Understanding the critical link between engine and transmission

by Steve Pond

THOUGH CLUTCHES ARE VERY IMPORTANT to the tuning of nitro-powered RC cars, they're often ignored. Most people simply install them and then forget them until they need to be repaired. But tuning your clutch properly can be as important to performance as tuning your engine is—especially when you're tuning a vehicle for highly competitive racing. Anyone who has ever ridden a motorcycle with a 2-stroke engine will tell you just how important it is to engage the clutch at the right time for the best launch. The automatic nature of a centrifugal clutch eliminates the human element from clutch operation, but proper tuning can still produce very noticeable gains.

Nitro engines differ from electric motors in how they generate power. Electric motors have fairly linear power delivery while nitro engines produce a pronounced power "curve." Being able to match clutch action with the nitro engine's power curve is what separates the winners from the also-rans.

The three types operate on the same basic principle:

As the engine rpm increase in response to throttle input, the clutch engages to deliver power to the drive train.

When and how a clutch engages is what's important in racing circles.

■ **Clutch engages too quickly:** the engine might stall, and even if it doesn't, it will still have to labor to get the car moving because early engagement doesn't give the engine a chance to get into its power band.

■ **Clutch takes too long to engage:** it will wear prematurely, and the car will still be slow to get moving from a standing start.

■ **How do you know when your clutch is adjusted properly?**

Unfortunately, because there are so many types of engine, clutch and applications, there is no precise formula for clutch tuning, but knowing how to tune your clutch and what to look for is half the battle.

To find out whether your clutch changes make any difference, you'll have to first test your clutch action. Try to run your tests in the middle of the day, when the weather is stable, on the same type of surface as the track you intend to race on—or at least on one that's very similar to it. Mark two parallel lines about 75 feet apart on the ground (that distance should be enough; the clutch should be fully engaged

Ease of adjustment is one of the elements that make Centax clutches so popular with on-road racers. Simply insert an Allen wrench into the adjustment hole and give the flywheel a turn. Voilà—adjusted!

well before the car reaches the second line). For the most accurate results, first run the car around for a couple of minutes to get the engine up to running temperature, and set the fuel mixture as you usually do. Set your vehicle on one of the lines, and then accelerate at full speed while someone times it with a stopwatch; put in three or four runs to get an average time. Then tune your clutch and repeat this test until you're satisfied with your clutch response.

Clutch tuning is pretty simple. The objective is to get from point A to point B as quickly as possible. You can tune a Centax clutch in less than 5 minutes, but it may take an hour to tune a conventional clutch.

CLUTCH OPTIONS

There are three basic types; all may be adjusted (tuned):

- Centax
- Centrifugal
- Centrifugal with a return spring(s) on the clutch shoes.



This Cross Admiral clutch is a Centax clutch. Weights that are affected by centrifugal force engage a one-piece circular clutch shoe with a conical clutch bell.

The Cross Admiral clutch shoe; the spring cup in the center is threaded to facilitate quick and accurate adjustment.



CENTAX CLUTCH

This is the easiest type to adjust. It typically has a coil spring that holds it in the disengaged position until the engine reaches a certain rpm. Spring preload determines how long it will take the clutch to engage: tighten the spring and it will take longer; loosen it, and the clutch will grab more quickly.

Centax clutches can be adjusted without your having to remove the engine from your car. (To adjust a standard centrifugal clutch, you might have to remove the engine.)

Start with the lightest spring tension, and turn the adjuster about an 1/8 of a turn between test runs until you stop seeing an improvement.

CENTRIFUGAL CLUTCHES

Adjusting either type is more labor-intensive because you usually have to remove the engine to access the clutch shoes.

■ **Centrifugal clutch without return springs:** adjust it by decreasing or increasing the weight of the shoes.

■ **Lightening clutch shoes:** start with the heaviest shoes. To lighten the shoes, cut about 1/8 inch off the trailing end of each one. Continue to lighten the clutch shoes until your test runs show that acceleration time has stopped improving. You should usually keep the clutch shoes a little heavier than this ideal weight to compensate for wear.

As the shoes wear, they become lighter and will slip a little more. Ideally, you should have about 1/8 inch of extra material on the clutch shoes. Make a note of where you made the last cut or hole, so when the current set wears out, you'll be able to replace them with slightly heavier shoes.

If you cut the shoes to lighten them, it means a smaller contact patch, and that makes the clutch engage more quickly and accelerates wear. You could instead drill holes through the clutch shoes to lighten them. This removes weight without changing the size of contact patch. A larger contact patch makes the clutch engage more smoothly and extends clutch-shoe wear. Continue to lighten the shoes until the response times stop showing an improvement.

■ **Increasing clutch-shoe weight:** adding weight to clutch shoes is less usual, but it's a tuning option. You are more likely to do this with clutches that have return springs (see below). To achieve a faster clutch response, you can increase clutch-shoe weight by inserting heavier material such as brass rod or music wire. In both shoes, in exactly the same location, simply drill a hole of the same diameter or slightly

Below: conventional clutch shoes are tuned, or adjusted, by having their ends cut to reduce weight.



The steel balls in the Cross Centax clutch are forced outward as rpm increase, and at the same time, they are also forced forward by their cone-shaped retainers; this, in turn, pushes the circular clutch shoe into the clutch bell.

smaller than the rod you plan to use, then press the rods through the holes, being careful to ensure that they don't stick out on either side of the clutch shoe. If the rods are shorter, it allows room for dabs of CA to keep them in place. I've never had to use more than one piece of rod in each shoe to get the proper reaction from the clutch, but if you need more weight, simply drill another pair of holes and add more rod.

■ **Centrifugal clutch with return springs—can be adjusted in two ways:**

1. Use springs with a different tension—lighter or heavier.
2. If you can't find lighter springs to quicken clutch response, you can increase or decrease the weight of the clutch shoes as already described.

TEST!

A shorter average time tells you that you're getting "warm," while a longer average time means that you may need to go the other way to make the clutch engage more quickly.

If the time improves, it clearly signals that your changes suit your engine/pipe/car setup.

■ **What if run times get worse when the clutch shoes are lightened?**

This isn't likely, but if you use spring-loaded shoes, the springs can be too strong to allow the clutch to engage quickly enough. If they're available, the first option should always be lighter springs. You can even bend or stretch the spring(s) slightly to improve their response. But if all else fails, adding weight to the shoes is a viable option.

Clutch tuning can be time-consuming at first, but everyone will marvel at how fast your car gets out of the hole! ■

Left: these clutch shoes are return springs from an HPI Nitro RS4. This type of clutch can be modified by using different springs or by changing clutch-shoe weight.



This RC10GT clutch has a conventional design; as rpm increase, the shoes move outward and engage the drum-shaped clutch bell.



Certain conventional clutches have return springs to disengage them when the engine is idling. Clutches with wraparound springs can be adjusted by using a spring with a lighter or heavier tension.

Build a Battery Pack

9 steps to a straight, tight pack by Greg Vogel

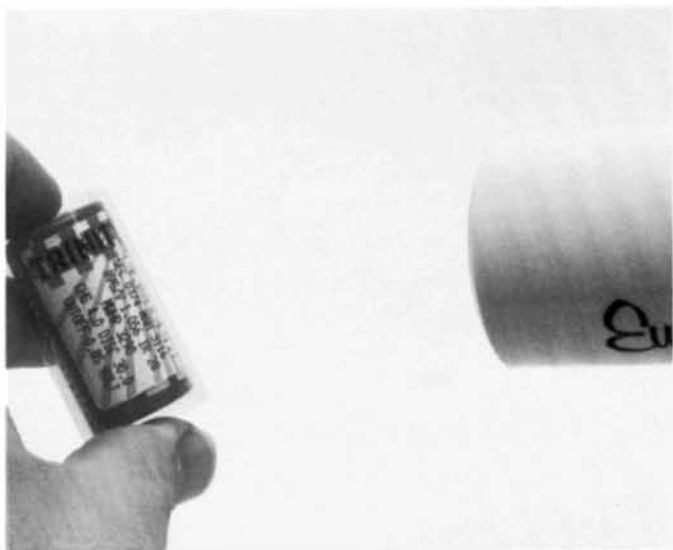
If you're buying expensive matched cells for your race machine, you probably don't want to goof them up (or worse, reduce their performance) by doing a hack soldering job. Here's how to build a tight, straight, clean pack that will fit in your car properly and deliver maximum performance.



1 Gather all the equipment you'll need: heat-shrink wrap, heat gun, X-Acto knife, solder, soldering iron, battery jig, battery bars, wire and connectors (if applicable).



3 Scuff the ends of the cells with a Scotch-Brite pad, fine sandpaper, or—in a pinch—use your X-Acto knife to scratch their ends; this will give the solder something to stick to.



2 To keep the cells' labels clean on a Trinity* matched pack and help prevent the chassis from marring the original covering or causing shorts, simply slide a piece of wrap over the cells and blast it with a heat gun or a hair dryer to shrink it.



4 Tin both ends of each cell with good-quality solder such as Acer Racing's* silver solder (shown here). I'm using an Ungar* Race Station for the soldering duties. This iron has a knob to adjust temperature, and at its hottest setting, it can quickly melt solder onto the cells. Don't hold the iron on the cells for long because excessive heating can damage them.



5 The easiest way to assemble a pack is in a jig—here, a Deans* jig. Now is the time to determine how the pack will sit in your car. Normally, the positive lead is in the back of an off-road car; use the cell layout patterns as a guide; a saddle pack's positive lead will be closest to the ESC. Remember: keep the labels facing up; it's just the cool thing to do. Place the cells in the jig so the positives will be soldered to the negatives.



6 Place a battery bar across the cells, as shown here, and place the spring clip over the bar to anchor it. Hold the iron on one side of the bar and feed a little solder onto the top of it. If you don't use a Deans jig, quickly put down the solder after you've applied it to the cell, and use the X-Acto knife to hold the bar while you remove the iron from it. When you've completed one side of the bar, follow the same procedure for the other side and for the rest of the pack. When you flip the pack over, be careful not to place a bar across two cells that have already been soldered together. Remember, you're completing a "loop" between the cells.



7 You've pretty much finished. If you're hard-wiring the pack into your car, take a battery bar and bend its top quarter over at a 90-degree angle. Solder the long end to the battery pack; solder the wire from your ESC to the bent portion. Connectors are easy to install, too; simply solder the positive side of the plug to the positive side of the battery, then repeat the procedure for the negative.

Saddle Up

1. To make a saddle pack, cut a length of wire that's long enough to span the bridge in the chassis. Replace the center battery bar with the wire using the procedure described in Step 6.



2. (optional). Glue the cells together with CA gel. Just apply a bead of gel between the cells, and give them ample time to dry. This will prevent the cells from coming apart in a hard impact. If you ever need to disassemble the pack, remove the battery bars and tear off the clear shrink-wrap you applied earlier. It may take a while to rebuild the pack, but the original battery shrink-wrap will not be damaged.



It's a snap to build your own packs. To make this job easy, I suggest using equipment of the same quality as shown here. A wood-burning iron from a hobby store may be able to melt solder, but it won't work well enough to heat all the components at once, which is what you'll need to do a good job. And building a pack without a jig may result in misaligned cells that won't fit in the chassis. You only want to do this once, so do it right. Take your time, and use the right tools.

**Addresses are listed in "Featured Manufacturers" on page 208. ■*

Team Orion Daren's Quick Set Motor Lathe

Now that rebuildable stock motors have taken over electric racing, a reliable commutator lathe is more invaluable than ever. I've been very slack in the motor-maintenance department, but I've resolved to become a hard-core motor man for 2000. To that end, I recently added a (deep breath) Team Orion® Daren's Quick Set Motor Lathe to my racing war chest. After buzzing all my tired comms, I think it's the best lathe going; here's why.

FEATURES

- **Pinned construction.** The Quick Set lathe's best feature is invisible unless you take it apart. Four steel dowel pins are pressed into the base to keep the side plates in perfect alignment during assembly (large-diameter bolts actually clamp the unit together; the pins just align the parts). If those side plates aren't perfectly square to the base and parallel with each other, you could end up with a cone-shaped comm; that's no good. I mic'd the comms I cut, and they're the same diameter end to end, just as they should be.

- **Centering/oil reservoir slots.** The armature spins in U-shaped slots that each have a thin groove in the bottom. This groove centers the armature in the lathe and also holds lubricating oil to keep the arm spinning freely.

- **Adjustable armature centering screws.** You can forget shimming the arm or installing a pinion to prevent the arm from wandering in the slots. A pair of screw stops are easily adjusted inward or outward to hold the arm where you need it to be for the precise alignment with the cutting bit and commutator.

- **On/off switch.** A push-button on/off switch is bolted at a convenient spot, and Team Orion's

high-quality Snake Wire is supplied to hook the lathe up to a 4-cell pack. I installed alligator clips (not included) for easy connection to my side-by-side packs, but you could install your favorite connector.

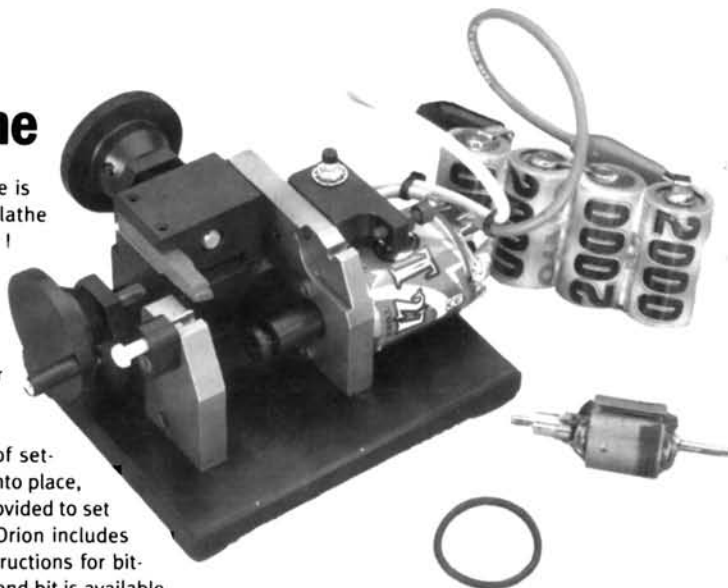
- **Carbide bit.** A pair of set-screws clamps the bit into place, and brass shims are provided to set the height of the bit (Orion includes brief but thorough instructions for bit-height setting). A diamond bit is available as an option.

- **Pilot motor.** A Team Orion Pilot 27-turn stock motor is included. This bushing stocker is perfect for lathe power, and it's nice to bolt in a fresh motor instead of last year's handout motor.

OPERATION

The Quick Set lathe requires some assembly: the motor and drive pulley must be installed, and the switch must be wired. A single photo shows the wiring hookup, but it's impossible to see which of the three lugs on the switch should be used. I'll tell you: use the center lug and either of the two outside lugs. Install the included carbide bit, and you're ready to cut comms.

The "Quick Set" name is definitely appropriate because it took only a second to slip the drive belt (a big O-ring) over the arm and drive pulley and then to dial in the "quick set" screws. I clicked on the power button, lubed the comm with Magic Marker (as the instructions suggest) and cut away. I made three passes to put a shine on the well-worn comm of an old machine-wound mod, and the lathe worked flawlessly. There's no slop in any of the slides (but they can



Likes

- Solidly constructed.
- Includes everything you need, right down to a motor and wire.
- Easy to use and produces high-quality cuts.

Dislikes

- Can't tell whether the push-button switch is "on" or "off" until the lathe is powered.

be adjusted if any develops down the road), and they operate smoothly with just the right amount of friction. I found the push-button on/off switch very convenient, and it eliminated the chance of arcing when connecting a pack. I'll nitpick and say I'd prefer a switch that can be visually confirmed as being "on" or "off," but that's me.

—Peter Vieira

Part no. —41600; price —\$100 to \$150.

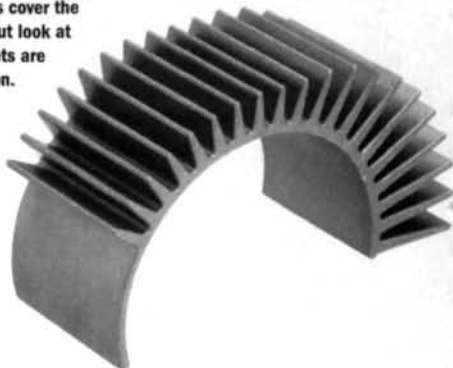
DuraTrax Battery Soldering Jig

When you solder batteries together, make life easy by using a battery jig. This unit from DuraTrax is constructed of four plastic pieces that can easily be taken apart and stored in your toolbox. This tool holds up to 7 cells, accepts all sub-C Ni-Cd and NiMH batteries and is always welcome when building packs. Part no.—DTXC 2435; price—\$3.99.



Associated Team Factory TC3 Clip-on Long Heat Sink

Not getting enough cooling for your sick 10-turn motor? This mamma-jamma of a heat sink with its large cooling surface will definitely dissipate heat. The new piece clips onto the motor and can only be used with the stock motor-clamp heat sink. Its large size does cover the fancy label on your motor, but look at it this way: your speed secrets are hidden from your competition. Our test TC3 did seem to run slightly cooler with the heat sink in place. Part no.—3928; price—\$13.



Progressive Suspension 1/8-scale Shock Reservoirs

Progressive Suspension* produces shocks and suspension kits for full-size motorcycles and gained notoriety among RC fans thanks to the externally adjustable damping system offered for 1/10 off-road machines. Progressive followed up with another innovative product—Piggyback Reservoirs, which are claimed to give more consistent damping throughout a race. Until now, the reservoirs have been available only for 1/10-scale shocks, but they're now offered for 1/8-scale gas buggies, and I mounted a set on my Inferno MP-6 to test them. The reservoirs will also fit the Kyosho MP-5, Mugen Seiki Super Athlete and MBX-4, Thunder Tiger Mirage and EB-4, and OFNA Blazer, Ultra and Ultra Worlds shocks.

FEATURES

Sold in sets of two (part no. PBR-2001—\$58.75) and four (PBR-2002—\$114.95), the reservoirs are offered in blue and black. As part of the deal, you get screws, washers and spacers to mount the units on the shock towers of the buggies listed. The reservoirs are threaded onto the shock bodies in the same way as regular shock caps, and a rubber washer or O-ring (depending on the application) seals the area where the shock cap meets the shock body.

To complete the setup, the reservoir is filled with the same oil as is in the shock. A piece of foam inside the reservoir holds the shock oil and acts as a volume compensator, and an O-ring-sealed aluminum cap is held in place with a retaining clip.

HOW THEY WORK

When a shock shaft of a fluid-damped shock slides into a shock body, fluid is displaced. It's

just like putting an ice cube into a glass of water; the level of the water rises because the ice displaces the water. Unlike an open glass of water, the fluid in a sealed shock has nowhere to go when it's displaced, and if the shock is over-filled, you won't even be able to compress the shock shaft. The Progressive Reservoirs allow you to completely fill the shock body to eliminate air bubbles, and they allow fluid to flow out of the shock when displaced by the shock shaft. The fluid flows into the reservoir when the suspension is compressed then flows back into the body when it extends.

Reduced fluid heating is another potential benefit. As the piston moves up and down inside a fluid damped shock, the fluid temperature increases slightly. The extra fluid in the Progressive system's reservoir will help keep the temperature of the shock down.

Likes

- **Functional and cool-looking.**
- **Improves smoothness of shock action.**
- **Seems to extend time between rebuilds.**

Dislikes

- **Proper assembly and setup can be time-consuming.**



BUILDING TIPS

- Before you begin, soak the fluid-compensating foam in shock oil, then squeeze it to work the oil into it and the air out of it. You won't have your hands free to do this later.
- Fill your shocks right up to the top, then tighten the reservoir cap.
- While holding the shock upright, slowly compress the shaft until fluid starts to flow into the reservoir, then turn the entire assembly upside-down. Follow Progressive's instructions to complete the job.

PERFORMANCE

After installing the reservoirs on my Kyosho MP-6, I noticed that the shocks felt like butter. When there isn't any air in the shocks, your suspension feels the same at the end of a race as it did at the beginning; and after a few races, the shocks felt just as good as on the day I built them.

One problem with the reservoirs is that if you decide to switch to oil of a different weight between rounds, it will take you a lot longer to do than with standard shocks, so make sure that you have enough time to build them right.

—Kevin Hetmanski

Trinity Triple-X Foam Car Stand

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Chris's BACK LOT

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o *R/C Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. My email address is: chris@airage.com.

BY CHRIS CHIANELLI

Peter goes fly boy Chris gets distracted

It's no secret: I love all types of models: cars, planes, boats, trains, high-fashion—oops. Anyway, when one of *Car Action*'s editors wants to give something new a try just for fun, he comes to see me. Why? BECAUSE I'M THE ALL-KNOWING, ALL-SEEING MODEL MANIAC—well, maniac anyway.

This time, it was our illustrious executive editor Peter Vieira who wanted to give flying a whirl. Pete is a meticulous modeler; you won't find a three-week old Whopper in his pristine toolbox, and he shows promise as an airplane guy. I gave Peter an ARF (almost ready to fly) Ace Hobby Whisper 1400 electric-powered glider. Peter had the thing ready to fly in the time it took to charge the included Ni-Cd battery, and we were out on the field (behind our office) in about 35 minutes.

Our training session was quick but intense. I had to drum a few aeronautical facts into

No no no!
Ya got it all
wrong! Just
shut up and
pay attention!

Jerk

Blah blah blah airspeed blah
blah blah lift blah blah blah
drag coefficient blah blah

Nice jumpsuit
Roger Ram Jet



I'm the perfect
student, following
instructions to
the letter



Piece o' cake.
I'll do a flyby for the
camera. You don't need no
stinkin' jumpsuit to be
a good flier

Peter's head. Things like: "No, Peter; plane don't need good traction." I am a tough instructor! I'm sure a few other adjectives will leave Pete's lips when he's asked about my teaching style, but who cares? Not me! I'm not here to win a popularity contest, just to make good pilots out of undisciplined car boys!

As it turned out, the grueling "crash course" in aerodynamics paid off. Once in the air, Pete seemed to be a natural, and I only had to give him minor pointers as he streaked skyward. All was well—that is, until I got distracted by a girls' tennis match at the courts adjacent to the field. I don't know what happened. One moment, I was telling Peter, "Yea, yea; you're looking good"; the next moment, I was jolted out of my trance (there were some awfully good-looking, long-legged, racquet-swinging athletes on that court) by Peter's frantic screaming: "Chris, help! I'm being sucked into the trees!"

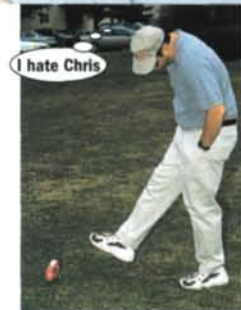
Now, we all know trees don't "suck," but I wasn't about to make an issue of it. I'm the instructor; it was my fault. I must admit, Peter was doing extremely well for a fledgling pilot—a lot better than my last student, Steve Pond, who quivered like a schoolgirl every time his plane got more than 20 feet above terra firma. Steve will always be a "down-in-the-dirt" kind of guy. ■



Is it OK if I
go buzz the
trees
Chris?
Chris!!!



Maybe the jumpsuit
does help



I hate Chris



Chris, I have a problem that doesn't have very much to do with RC. My problem is that I'm great at pickin' up chicks, but I'm horrible at starting conversations that get them really interested in me.

Any ideas would be greatly appreciated.
Matt

Yea, not much RC there. Like most things, Matt, it's simple. DON'T bore them with a lot of talk about yourself. Ask them about their hopes and dreams. Make them laugh. And you're in.
CC